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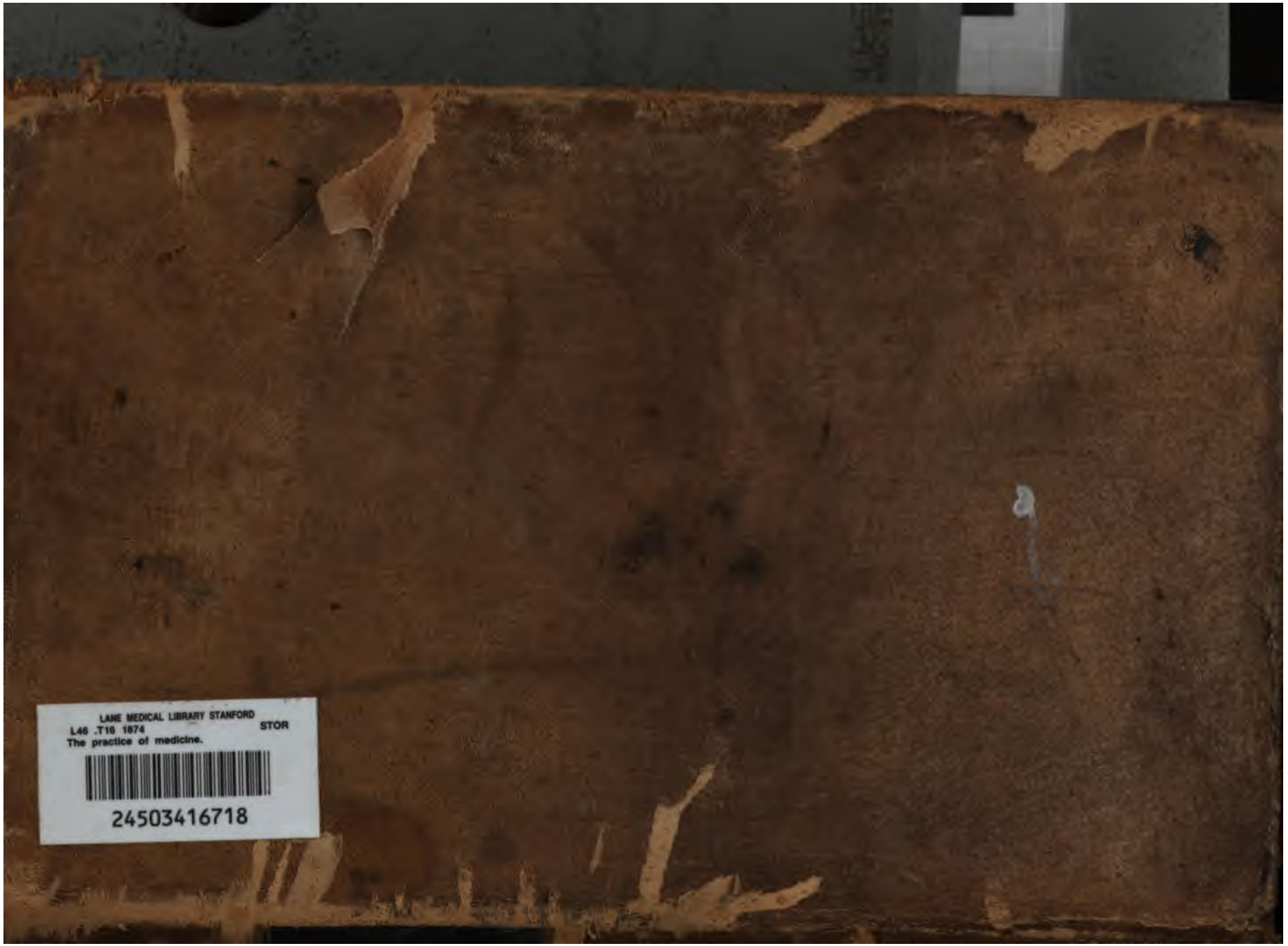
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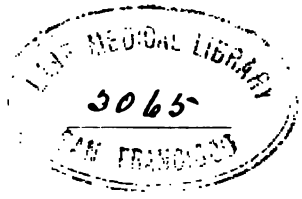
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SIXTH AMERICAN,

FROM THE LAST LONDON EDITION:

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THIS VOLUME

IS

INSCRIBED.

PREFACE.

A SIXTH Edition of the Practice of Medicine having been demanded, all the time which could be spared from other onerous duties during the last two years has been devoted to rendering it more worthy of the great encouragement hitherto bestowed upon it. The fact of the book having been out of print for several months has been a subject of considerable regret, though it is hoped that the reader will now reap the benefit of the unavoidable delay which has taken place in preparing the reissue. For inasmuch as our knowledge of diseases and their treatment has been steadily advancing since the publication of the last edition in July, 1865, I have been exceedingly unwilling to allow these volumes to pass out of my hands until such new matter as was necessary had been added, and until every page had been carefully and deliberately conned over. In this way the work has become much enlarged. Nevertheless, the original plan has been adhered to, of making its pages the medium of as much practical information as possible. Especially have I aimed at adopting a style which should be terse, without appearing obscure; while the endeavor has also been made to give particular prominence to those points which will aid the practitioner in the discharge of his responsible duties at the bedside.

Without attempting in any degree to deprecate criticism, it is still due to my readers to say how sincerely I trust it may not be thought that too dogmatic a tone has been adopted in the remarks upon the treatment of disease. But more than twenty years of daily observa-

tion have given me great confidence in the strength of the general principles which I have tried to inculcate in the following pages; and being thus zealously impressed, it is difficult (even were it advisable) to do otherwise than speak positively.

In conclusion, I cannot help expressing a hope that this work may still prove as useful, as its many friends have assured me it has hitherto been. While preparing each new edition I have felt my responsibility greatly increase; but the labor and anxiety have been lessened by bearing in mind Dr. Arnold's remark: "That so long as you humbly learn, so long you may hopefully teach."

HENRIETTA STREET, CAVENDISH SQUARE.

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THE

PRACTICE OF MEDICINE.

PART I.

GENERAL DISEASES.

I. MORBID STATES OF THE BLOOD.

1. **INTRODUCTION.**—A nutritive fluid circulates through the tissues of all organized beings. This liquid, which is essential to life, is known as the sap in plants, and the blood in animals. The elaborated juice constituting the former is probably simply nutritive: the liquid flesh, as the latter has been termed, is a nutrient and something more, viz., the means by which used-up materials are removed from the system.

In vain will the attempt be made to understand the nature of the various diseases to which the human body is liable, without a knowledge of the constitution and properties of the blood: that fluid which we have been emphatically taught "is the life of all flesh," through the instrumentality of which the various changes which attend the phenomena of life are accomplished, and by means of which the different organs and tissues of the body are directly nourished. The study of this subject, surrounded as it is with difficulty, is as interesting as it is important. And though it must be allowed that much has yet to be learned, especially with regard to the chemical and microscopical characters of the blood in disease, yet not only are valuable observations gradually accumulating, but the improved methods of examination which can now be employed promise to yield very significant results.

The characteristics of the living organism are ceaseless change and ceaseless waste. Directly man begins to live, he begins to die. In the blood, as in the different tissues, the processes of decay and regeneration—of destruction and reconstruction, only terminate with the extinction of vitality. During action, the tissues waste; during repose they are nourished, and the waste is repaired. That "the lamp of life" may burn brightly, the material for chemical action must be supplied in fitting proportions. Hence to breathe, to eat, to drink, to sleep—in other words, to maintain a due supply of the liquid by which nutrient matter is distributed to the various tissues—are the indispensable conditions of life. In the course of a single year an adult healthy man receives air and food and water amounting in the aggregate to more than 3000 lbs. (2240 lbs. = 1 ton); while in the same period of time he loses by urine and fæces, by transpired and expired matters, the

same enormous amount of material. In infancy and youth the receipts are greater than the expenditure, and hence there is a gradual increase of weight. The bloodvessels, while they carry a certain amount of nutritive material to the tissues, only receive a smaller quantity of wasted material from them. But in old age this rule is reversed; and then as with the improvident, the means of repair become at length exhausted. The same thing happens in disease,—the general condition of equilibrium is upset; the balance being still further destroyed, owing to the useless or poisonous agents generated within the system not being removed as speedily or completely as is necessary.

Life is only to be maintained by the circulation of arterial blood; and whether no blood circulates through the arteries, or merely venous blood, the result is the same—death. When no blood circulates, death is said to take place from *syncope;* and this is of two kinds. First, death by *anæmia*, in which there is a want of the due supply of blood to the heart, as is witnessed in fatal hemorrhage, &c.; secondly, death by *asthenia*, where there is a failure in the contractile power of the heart—and this is seen to occur from the action of certain poisons, from intense grief or terror, from lightning, concussion, blows on the epigastrium, as well as from certain forms of apoplexy. It must be remembered that in some instances dissolution is due partly to anæmia and partly to asthenia; as may be particularly noticed in fatal cases of starvation, and in lingering disorders like phthisis, dysentery, &c.

When venous blood circulates through the arteries, life will be destroyed in one of two ways. In the first place we have death by *asphyxia*, or more correctly speaking by *apnœa* [Ἀ = priv. + πνέω = to breathe], or *suffocation*, where the access of air to the lungs is prevented; as occurs in drowning, strangulation, choking, immobility of the respiratory muscles from tetanus, section of the phrenic and intercostal nerves, obstruction of the larynx by false membranes, many diseases of the lungs, and so on. Secondly, there is death by *coma*, in which the muscular movements required for respiration cease, owing to insensibility produced by some cerebral mischief; examples of which form are seen in many affections of the brain. Thus in death by apnœa we have successively impeded respiration, the circulation of venous blood, and insensibility; while in coma the order of the phenomena is reversed, and we find insensibility, cessation of the thoracic movements, and a stoppage of the chemical functions of the lungs.

The blood may be described as an albuminous fluid, charged with salts, holding fibrin in solution, and containing both colored and colorless corpuscles. It is of high specific gravity, being on the average 1055, reckoning that of water as 1000; the extremes, compatible with health, varying from 1050 to 1059. The specific gravity is diminished by bleeding, anæmia, albuminuria, scurvy, gout, &c.; while it is increased in cases of plethora, as well as in diseases attended with copious watery discharges—*e. g.*, cholera, diabetes. The temperature is about 100° F.; being higher in the arteries than in the veins, with one or two exceptions. Bernard found the blood in the hepatic vein to range from 101° to 107°; while in the aorta it varied from 99° to 105°. The reaction is constantly alkaline, the degree of alkalinity being greater during fasting than after food has been taken. The menstrual discharge, which consists of blood, offers no exception to this rule, in its pure state; the acidity it sometimes manifests being merely due to the admixture of an acid mucus as the flow passes along the vagina. In fact, throughout the animal kingdom, the circulating fluid is always alkaline; though it becomes spontaneously acid after death,

owing—according to Bernard—to the sugar it contains being converted into lactic acid.

The statements made by physiologists as to the total quantity of blood present in the body vary greatly; some observers estimating it at from one-fifth to one-eighth of the entire weight. Thus, Valentin says that from experiments on cats, dogs, rabbits, and a sheep, he was led to the conclusion that the blood has to the weight of the body a proportion of 1 to 4.08 to 1 to 6.32. Herbivorous animals had, on an average, less blood than carnivorous. Taking one-fifth as the mean value, he believes that a man of 30 to 40 years, whose average weight amounts to 140 lbs. would have 28 lbs. of blood. Wrisberg collected 21 lbs. 7¾ oz. from a very plethoric woman after decapitation; while it is said that he saw 28 lbs. 11 oz. lost by uterine hemorrhage! On the other hand, Weber and Lehmann, from experiments on the bodies of two criminals who suffered death by decapitation, obtained results which seemed to show that the proportion was as 1 to 8; so that the body of a man weighing 140 lbs. would contain 17½ lbs. of blood. But again, the more recent and trustworthy investigations of Welcker tend to make it probable that even this proportion is too high; and that in man and the mammalia generally the average relative weight of the blood to that of the body is only as 1 to 14. Hence the vessels of an adult healthy man will probably contain about ten pounds of blood; the maximum being found as the digestion of a hearty meal is drawing to a close.

There is an immense difference—a difference of life and death—between the blood which enters, and that which issues from the lungs. The former (venous blood) comes to the lungs charged with carbonic acid. The latter (arterial blood) is the fluid which maintains life, and which circulates between the lungs and the systemic capillaries. The course of the circulation is as follows: The right auricle of the heart receives the blue venous blood of the whole body by the ascending and descending venæ cavæ and the coronary sinus. From the auricular cavity it flows into the right ventricle, and so into the pulmonary artery to be distributed through the lungs. Returning thence, the now crimson arterial blood is driven along the pulmonary veins into the left auricle, and then into the left ventricle. From the latter it is urged into the aorta; and by the ramifications of this vessel is distributed to all parts of the system, to be again returned by the capillaries and venous trunks and venæ cavæ. The change of impure venous blood into pure arterial blood depends upon the exhalation of carbonic acid with the vapor of water, and the absorption of oxygen by the red blood-corpuscles; so that a transudation of gases takes place as the blood in its flow through the pulmonary capillaries becomes exposed to the influence of the atmosphere in the cavities of the air-cells. The alteration from arterial to venous blood occurs in the systemic capillaries, and is due to the hæmatin yielding up the oxygen associated with it, and becoming charged with carbonic acid. The theory, that in the act of respiration a combination or perfect oxidation took place in the lungs, owing to the oxygen from the air uniting with the carbon from the blood and forming carbonic acid, has been abandoned by some authorities. But since the experiments of Magnus, which led to the opinion that the oxygen and carbonic acid exist in the circulating fluid in solution or association and not in a state of intimate chemical combination, Liebig and others have adduced arguments tending to a revival of the first view. Allowing that the question is undecided it seems to be generally thought that these gases are partly free in the blood, and partly in a state of loose chemical combination. According to the researches of Pettenkofer on the elimination

of carbonic acid and the absorption of oxygen by day and by night it appears, that large quantities of carbonic acid are formed during the day, while the absorption of oxygen at this time is comparatively small. But at night, during repose, a considerable quantity of oxygen is absorbed; which, instead of being at once used up for oxidation, is, as it were, stored away in the system, ready for the wants of the ensuing day. In other words, the process of oxidation has many intermediate stages; and these occupy the oxygen for some hours within the system, before it is finally eliminated in the form of carbonic acid and water.

On minutely examining the blood as it exists while circulating in the vessels, we find it to consist of a transparent yellowish liquid called the liquor sanguinis, or plasma; which is formed of serum holding fibrin in solution, and in which are contained very numerous red disks termed blood-corpuscles or blood-cells, together with a few larger colorless corpuscles. A red blood-corpuscle, in the human subject, is a circular flattened cell without a nucleus, averaging $\frac{1}{3500}$ of an inch in diameter, and $\frac{1}{12000}$ in thickness, having an external structureless and elastic membrane, and red contents. The presence of an investing membrane is, however, denied by some physiologists. By such, these disks are regarded as homogeneous masses of a definite shape, rather than as bodies having a cell-wall with semifluid contents. In the first months of intra-uterine life, with all the mammalia, nuclei are present; while the same is the case during the whole existence of frogs, fishes, and birds. The corpuscles, as has been mentioned already, obtain oxygen in the pulmonary circulation, and transfer it to the most remote parts of the tissues they pervade,—being aptly termed carriers of oxygen; and then having given up this vivifying principle they return charged with carbonic acid to the pulmonary air-cells, where they part with this impurity and receive a fresh supply of oxygen. The contents of the blood-cells consist of a peculiar substance impregnated with red coloring matter, summarily called hæmatin. This latter contains a large amount of iron; and from it, under certain circumstances, three kinds of microscopic crystals can be obtained. The first variety of crystals has been named by Virchow *hæmatoidin*. They are formed spontaneously in the body, out of the hæmatin in coagula occurring in the Graafian vesicles, obliterated vessels, brain, &c. These crystals may be described as oblique rhombic columns of a yellowish-red or deep ruby tint, according to their thickness. Sometimes they resemble small crystals of uric acid or of the triple phosphates found in urine. And they are important because an effused mass of blood, as in apoplexy, cannot be removed, except by a large portion of it undergoing this form of crystallization. Moreover, hæmatoidin presents properties which show that it is allied to the coloring matter of the bile—biliverdin. The second kind of crystals has been called *hæmin*. Their pathological interest is small, inasmuch as they have to be produced artificially, by chemical tests; but they become of great significance to the medical jurist by affording a test of the presence of blood.* While the third class has received the name of *hæmatocrystallin*; crystals of this kind being very perishable, and only forming at a certain stage in the destruction of the blood-cells. This crystalline substance was also formerly named globulin, owing to its erroneously supposed identity with the protein-body obtained from the crystalline lens.

The colorless or lymph-corpuscles (termed *leucocytes* by Robin) have an

* The mode of obtaining these crystals as tests for the detection of blood-stains is shown in Virchow's work on Cellular Pathology, translated by Dr. Chance. p. 145. London, 1860.

average diameter of $\frac{1}{2500}$ of an inch. They are frequently circular and nearly spherical in shape, though they have the power of rapidly taking on various irregular forms. They are destitute of all color, and very delicate in structure: whether they have any true cell-wall is uncertain. They possess soft and granular nuclei. The proportion of these white corpuscles to the red, in health, may be roughly stated as 1 to perhaps 370 or 400; although as they are immediately increased by food much will depend upon the time after a meal at which the examination is made. When first discovered they were mistaken for pus-corpuscles, the result of pyæmia. The importance of these corpuscles in disease will be shown in the remarks subsequently to be made on leucocythæmia. At present it need only be added, that many physiologists allow that they are identical with those bodies occurring in lymph, chyle, semen, colostrom, mucus, and pus, to which the general term *cytoid corpuscles* has been applied.

In addition to these red and white blood-cells, the higher powers of the microscope reveal the presence of numerous minute molecules or granules, similar to those found in the lymph and chyle. During digestion especially, according to Gulliver, minute fatty particles may also be detected, exactly like those constituting the molecular base of chyle.

When the blood is fresh drawn from the body, it forms, in about ten minutes, a gelatinous mass; this singular alteration being caused by the tendency of the particles of fibrin dissolved in the plasma to agglutinate together. In some fifteen minutes, when the process of solidification is complete, the glutinous mass will be found to be shrinking and resolving itself into two distinct portions; which are known respectively as the *crassamentum* or *clot*, and *serum*. This shrinking is due to the further coagulation or contraction of the fibrin; and it continues for some thirty or forty hours, after which time no more serum is expressed. The *clot* consists, then, of the fibrin holding the red corpuscles entangled within the meshes it has formed. These corpuscles will either be equally diffused through the clot; or they may, by sinking from its surface, leave the upper part colorless. Where the latter happens, the colorless layer of fibrin, not being incumbered with corpuscles, contracts more than the lower part; and under these two circumstances the clot is said to be "buffed" and "cupped." The *serum* is the liquor sanguinis minus the fibrin; and consequently there is a most important distinction to be drawn between the plasma of living blood—so to speak—and the serum of blood removed from the vessels. This serum consists of a pale-colored and watery solution of albumen; having a density of about 1029, being of alkaline reaction, and holding in solution many important substances. The albumen is probably associated or combined with soda; and it is the plastic material from which the tissues of all parts of the body are nourished, and by which the cells themselves grow. When deficient in quantity, indications of defective nutrition gradually become apparent. The fibrin probably arises from it, to be used up for the renovation and repair of the muscular tissues.

The attention of physiologists has long been directed to the discovery of the essential nature of this process of coagulation. But the question, What is the cause of the solidification of the fibrin, in blood both in and out of the body? is still one that cannot be answered. There are objections to every theory which has been propounded: to that of John Hunter, that "coagulation is an operation of life;" to Hewson's, that the phenomenon is mainly due to the influence of atmospheric air; to Scudamore's, that it is greatly promoted by the escape of carbonic acid; to Draper's (a revived theory), that the fluidity of the blood during life is maintained by the muscular tissues picking out the fibrin, as it is solidified, for their nutrition;

and to Richardson's (now withdrawn), that the evolution of ammonia is the essential cause of the change. We only know for certain that coagulation is favored by rest, warmth, free access of air, and the multiplication of points of contact (Lister). Moreover, the subtraction of the influence of living vessels is, in all probability, largely instrumental in causing this phenomenon.

It is difficult to give the exact chemical composition of the blood; since this fluid is not only altered in quantity and quality in different diseases, but it is also modified by the amount and variety of food taken. The following table, however, may be regarded as indicating the proportion of the constituents of healthy blood in 1000 parts:

Water,	784.
Oxygen, Carbonic acid, Nitrogen, — dissolved in the fluid.	
Cell membrane, Hæmatin, — constituting the red corpuscles,	131.
Fibrin,	2.5
Albumen,	70.
Salts: Phosphate of soda, lime, magnesia, and iron, Sulphate of potash, Chlorides of sodium and potassium, silica, &c.,	6.
Fats: Margarin, Olein, Serolin, Cholesterin, Phosphuretted fats, &c.,	1.2
Extractive matters (creatin and creatinin among the most important), with traces of urea, uric acid, biliary coloring matter, &c.,	5.8

The blood receives matter from three sources: from the atmospheric air, through the lungs; from the primary digestion, which takes place in the alimentary canal; and from the secondary digestion, as that process is called by which the tissues which have served their purpose and become effete, are absorbed to be discharged from the economy. In return, it affords material for building up the tissues, for forming the secretions, and for producing the excretions; while it also warms every part of the body. Hence, whatever interferes with the process of chylification, with respiration, with the excretory organs (as the bowels, liver, kidneys, and skin), and perhaps with the healthy condition of the nervous system, will affect the composition of the blood. Mr. Paget adopts the proposition found in the writings of Treviranus,* to the effect that "each single part of the body, in respect of its nutrition, stands to the whole body in the relation of an excreted substance;" and this certainly seems to be true. Thus, to take only one example, it can readily be understood that the phosphates deposited in the bones are as effectually excreted from the blood as those which are discharged with the urine. In health, then, when the sources of the blood are duly supplied, and when all the various organs and tissues abstract from this ever-circulating fluid the special materials they need, a

* Die Erscheinungen und Gesetze des organischen Lebens, Band i, p. 402. Bremen, 1831. Mr. G. H. Lewes, in his work on the Physiology of Common Life, vol i, p. 286, states that this conception is due to Caspar Friedrich Wolff, whose doctrine of epigenesis rests upon it. See Theorie von der Generation, 1764.

general balance is maintained in the system; but allow the rough materials for forming blood to be too large or too small in quantity, or let one organ act imperfectly, and every part of the body becomes necessarily more or less unfavorably affected.

The changes which take place in the blood under different circumstances will be noticed in treating of the various disordered states of the system. It may, however, be useful to premise that as disease and death can arise from certain elements which are indispensable to the healthy nutrition of organs being deficient or absent in the food, so equally disastrous results will follow from injurious matters being retained or introduced in the blood. To speak somewhat loosely, moreover, it can be noticed that inflammatory disorders remarkably modify the composition of the blood; diminishing the albumen, doubling the amount of cholesterin, and increasing the quantity of fibrin to as much as even 10 parts in 1000. During pregnancy the white corpuscles and the fibrin are increased, the red blood-cells becoming rather deficient. Venesection, or hemorrhage in any form, chiefly reduces the amount of the red particles, and to a slight degree lessens the quantity of the albumen and fatty matters; while it also diminishes the density of the serum. In Bright's disease and in cardiac dropsy the albumen is greatly diminished, owing to its escape in the urine or in the effused fluids; whereas this element is probably increased in scrofula and cancer. As regards starvation, scurvy, exhaustion from lingering disease, dipsomania, and fevers, the amount of fibrin is diminished. A super-alkaline condition of the blood may be produced by the use of alkalies, by abstinence from food, and by some forms of disease—*e. g.*, typhoid and putrid fevers.

The chief source of the blood being the food, it follows that the careful selection and preparation of nutriment are among the most pressing necessities of our daily life. To expect to maintain healthy blood by scanty or improper food is as vain, as it is to hope that the healthy nutrition of the various tissues can be kept up by insufficient or morbid blood. There is, for example, no better established physiological axiom, than that the production of muscular activity depends on a free supply of pure arterial blood to the muscles; this supply being needed to facilitate that incessant transformation which is the necessary condition of muscular action, as well as to restore the waste. Of the various alimentary principles, not one of them taken singly is capable of maintaining the normal constitution of the blood. Albumen, fibrin, gelatin, gluten, sugar, starch, animal or vegetable fat, &c., consumed separately, cannot support life save for a very limited period. Moreover, in several experiments upon animals it has been found, that the attempt to maintain nutrition by any one of these substances alone, creates such disgust that the animal at length refuses to eat of it, even though dying of starvation. The value of every diet table, nay of every substance used as food, does not depend therefore upon the amount, however great, of any one alimentary principle that it may contain, but upon its possessing several such principles, blended in the proportions required for proper nutrition. Of the four organic elements (oxygen, hydrogen, nitrogen, and carbon) which principally compose the human body, nitrogen and carbon are those which have to be supplied most freely in the food; inasmuch as the phenomena of nutrition arise from the chemical interchanges of these elements, with the co-operating influences of oxygen and hydrogen, and certain salts. An average male adult in good health, performing an average amount of daily work, requires in the twenty-four hours from about 250 to 350 grains of nitrogen; from 3500 to 5000 grains of carbon; and perhaps 400 grains of salts. Or, if we speak of nitrogenous

and carboniferous foods it appears, that three or four ounces of the former are needed to twelve or sixteen of the latter.

The *nitrogenous substances*, or albuminates, or plastic constituents of food, are those which are capable of being converted into the albumen or fibrin of the blood, and so of being assimilated subsequently by the tissues. The nitrogenous elements are in part heat-giving; but chiefly they are indispensable for the formation of muscular and nervous tissues, &c. The *fatty aliments*, including all animal and vegetable oils, are essential to nutrition. They are both plastic and calorifacient. To keep up mechanical force, the fats have to be furnished in due proportion just as the albuminates must be supplied. The *carbo-hydrates*, or starches and sugars and gums, are believed to be simply combustible or heat-giving, and not plastic. In addition to these three great groups, it is necessary that certain *salts* and *water* be provided. Phosphate of lime, chloride of sodium, potash, magnesia, iron, and other saline matters, are needed in the production of osseous and muscular and nervous substance; and as the body is constantly parting with these inorganic substances, so health cannot be maintained without their restoration. Fortunately, they are largely present in our drinking-waters and meat and vegetables. Thus, the mineral elements in wheat, potatoes, watercresses, &c., are of great value. Then as water constitutes about four-fifths of the body, it can be understood how vitally significant the aqueous part of food must be. All-important as solid food is, yet its loss is by no means so early appreciated by the system as is the deprivation of liquids. There still remains a group of substances which may be called *complemental foods:* that is to say, without acting as heat-givers, or muscle-makers, or bone-builders, these substances retard the destructive assimilation of tissue; while by their action on the nervous system they give rise to agreeable impressions, and render both mental and bodily labor less exhaustive than hard work proves to be without their aid. The chief articles in this class are tea and coffee, alcohol, and tobacco. They may all probably be regarded as compensating agents for a deficiency of food. Equally, where an excess of nourishment is consumed, the injurious consequences will be increased by these things—more especially by alcohol and tobacco.

An important question which remains to be noticed is, as to the quantity of food required for the maintenance of healthy nutrition? Now in answering this it is only possible to speak somewhat vaguely—to deal with generalities; so necessary is it that the amount should be modified according to age, climate, habits of life, custom, and so on. The healthy man who takes but little out of himself in the shape of work, will be called upon to restore less tissue-waste: and hence, his food ought to be less rich in flesh-formers than that of an active laborer—whether of mind or body. But granting this, there are still certain principles applicable to the average man, and these now claim a short notice. The daily loss of substance being great, an equivalent amount of liquid and solid aliment has to be introduced from without, if we would ward off disease and maintain life. Allow too much food to be consumed, and hyperæmia with other morbid conditions will result. Give too little, and inanition must be the consequence sooner or later. Too much work in proportion to the food can only lead to disease and death; it is impossible to obtain force without fuel. The daily discharge of water, as fluid or vapor, from the system being very large (it has been estimated at about 4 lbs. avoirdupois), it can be understood how urgent the demand for drink must be—as urgent almost as the need for oxygen. Of course, water is taken into the body in other ways than as a simple fluid, *e. g.*, abundantly in succulent meats and vegetables,

&c. The amount of solid food required may be shown theoretically by estimating the solids in the various excretions. As actual observations are, however, more satisfactory, it suffices to refer to the experiments performed by Professor Dalton, of New York, on himself. This gentleman found that while living on an exclusive diet of bread, fresh meat, butter, and coffee, with water for drink, the entire supply required during the twenty-four hours by a man in full health, taking free exercise in the open air, was as follows:

Meat,	16 ounces, or	1.00 lb.	avoirdupois.
Bread,	19 "	1.19	"
Butter or fat,	3½ "	0.22	"
Water,	52 fl. oz., or	3.38	"

That is to say, rather less than two and a half pounds of solid food, and rather over three pints of liquid. Had Professor Dalton been anxious to substitute other articles for the pound of meat, he might have secured the same amount of nitrogenous material (rather more than three and a half ounces) by taking four pints of milk, or fourteen eggs, or one pound and a half of oatmeal, or about two pounds of wheat flour or Indian meal, or five pounds of rice, or sixteen pounds of potatoes. None of these could, however, be taken continuously and solely without more or less detriment, except the milk and eggs. The latter must be nutritious, since they contain every principle required in the development of the chick. But of all the articles in daily use, there is not one which more perfectly illustrates what a model food should be than milk. This is shown very clearly in the following analysis of cow's milk by Payen:

Water,	86.40
Nitrogenized substances (casein, albumen, lactoprotein, and matter soluble in alcohol),	4.30
Lactose (sugar of milk or lactin),	5.20
Butter (or fatty matters),	3.70
A trace of coloring and aromatic matters.	
Salts, slightly soluble, { Phosphate of lime, " magnesia, " iron, }	0.25
Soluble salts, { Chloride of sodium, " potassium, Phosphate and lactate of soda, }	0.15
(Sp. grav. 1032, at 60° Fahr.)	100.00

The foregoing table not only exhibits the value of milk as an article of ordinary diet, but it serves to illustrate the great importance which should be attached to this food as a restorative in disease. Believing that milk is less employed in the sick-room than it deserves to be, the practitioner will find himself frequently reminded of its great utility in the ensuing pages.

It will now be convenient to notice in succession those disorders which in the present day are specially known as *blood diseases*.

2. HYPERÆMIA.—Plethora, or fulness of blood [*hyperæmia*, from Ὑπέρ = in excess + αἷμα = blood; *polyæmia*, from Πολύς = much]; consists of an increase in the whole mass of the blood, to an extent very variable in different cases. There is always a superabundance of the red corpuscles. The proportion of fibrin is probably unaltered, or it may be slightly increased [*hyperinosis*, from Ὑπέρ = in excess + ἶς, ἰνός = the fibre of flesh]. The albumen of the serum is unchanged; the quantity of water being rather diminished.

When the blood merely exists in too great abundance in one or more particular organs or tissues we say that there is local hyperæmia, or partial plethora, or congestion or determination of blood. There is no increase in the total amount of blood, nor in any of its constituents. Indeed partial plethora not uncommonly occurs in cases where the blood, taken as a whole, has been much diminished in quantity or quality by disease. Thus I have seen a woman lose a large quantity of blood by flooding directly after parturition, and yet the breasts have become greatly congested at the end of forty-eight hours, just prior to the secretion of milk. Again, if an organ be irritated mechanically, we cause an increased flow of blood to it through the arteries, thus giving rise to *active* congestion; a condition which, after a time, either decreases insensibly, or ends in hemorrhage, or passes into inflammation. When the return of blood to the heart through the veins is impeded, as by the compression of one or more venous trunks, we have what is called *mechanical* congestion. Or again, the circulation of the blood through a part may be sluggish owing to want of tone in the walls of the veins and capillaries, as is often seen in persons debilitated by age or disease. We then have *passive* congestion.

The blood being directly fed by the chyle, it is evident that too free living must be one of the most common *causes* of hyperæmia. The normal waste of tissue, and consequent expenditure of blood, is also impeded by a sedentary mode of life. Sometimes this condition is hereditary; and not unfrequently I have found it occur in women after "the change of life." So again, plethora may result from the loss of an important part of the body. Thus, a spare man some months after amputation at the hip-joint became strong and robust and red-faced; for since he took as much food as he was accustomed to consume before the disease set in which rendered removal of his limb necessary, so of course he made as much blood as appeared needed for the nourishment of his body prior to nearly one-fourth part of it being removed.

The existence of general hyperæmia is marked by *symptoms* which cannot be overlooked. The face appears full and turgid, with a purplish tinge. The eyes seem rather small, and the conjunctivæ more moist than usual. There is distension of the capillaries, as can be observed on the lips and mucous surfaces. The pulse is large, somewhat hard, and resistant. There is also a turgid appearance of the veins. Obesity is sometimes an accompaniment, though by no means an infallible sign of plethora. Indeed, as will be mentioned in a subsequent section, many fat persons suffer from a deficiency, rather than from an excess of blood; and consequently they bear lowering measures during the progress of disease very badly.

Hyperæmia produces lassitude and indolence; a desire for sleep, which is often accompanied with snoring and dreaming; a liability to fits of vertigo and headache; and sometimes attacks of hemorrhage, especially from the nose or from congested piles. In uncomplicated cases, there is not necessarily any special liability to dropsy, or fever, or inflammation. The blood, though present in excess, may yet be healthy, and will possibly be distributed equally to every part of the body. The chief fear is, that owing to the distension of the vessels the walls of one or more of them will give way; a result of little moment if the blood escapes out of the body, though of vital consequence if it flow into the delicate structure of the brain from some ruptured capillaries.

The *treatment* of general plethora must consist in the adoption of a restricted diet, or the employment of non-nutritious substances; in the avoidance of beer and all other alcoholic drinks; in lessening the hours

devoted to sleep; and in the use of active exercise in pure air. Saline purgatives often do good (F. 165, 167, 169). The bromide of ammonium (F. 37) might be useful. So also, rather large doses of liquor potassæ (F. 73) have been recommended, especially where there is a rapidly-increasing tendency to grow fat; although the efficacy of this medicine is very doubtful. In extreme cases the abstraction of blood ought to be had recourse to; the quantity to be taken being measured by the immediate effects. Venesection judiciously employed will often afford sensible relief; and provided the intervals between its employment be not too short, it is difficult to see what harm can arise. Of course I am supposing, that though the body is healthy in structure there exists more or less distress; this being due to the blood-forming process going on too rapidly.

3. ANÆMIA.—Deficiency or poverty of blood [*anœmia*, from Ἄναιμος = bloodless, the opposite condition to Ἔναιμος = full-blooded; *spanœmia*, from Σπανος = thin or poor + αἷμα = blood; *hydrœmia*, from Ὕδωρ = water; or *oligœmia*, from Ὀλίγος = little]; arises generally in cases where there has been deprivation of the proper materials necessary for the formation of healthy blood; such materials consisting of good food, pure air, light, sufficient clothing to afford protection from cold, &c. Anæmia is met with where the digestive functions are imperfectly performed, as well as in the course of many serious chronic maladies. It occurs also in those diseases which are attended with a gradual draining of the circulating fluid,—as happens in persons suffering from bleeding piles, dysentery, women with menorrhagia or cancer uteri, &c. Profuse discharges of watery or albuminous fluids lead to it; while the same condition may of course be produced artificially by excessive venesection, the administration of mercury or antimony or active purgatives, and such like means. The anæmic state is not peculiar to any particular period of life: both males and females are equally affected by it. If the blood be analyzed, it will be found that the red globules are deficient. Instead of existing in the proportion of about 130 per 1000 parts, as in health, they are reduced to 80 or 60, or even (in severe cases) to 30; while the hæmatin in those present seems paler than it should be. The number of the white cells is probably unaltered. The fibrin usually remains as in health, though it has sometimes been found diminished [*hypinosis*, from Ὑπὸ = under + ἶς, ἰνὸς = the fibre of flesh]. The liquor sanguinis is likewise poor in albumen; the quantity of water being more or less increased.

Those varieties of anæmia which are caused by tuberculosis, amyloid degeneration, fatty degeneration, albuminuria, carcinoma, scurvy, &c., will be treated of at length in succeeding pages.

Symptoms.—This disease proclaims both itself and its nature—impoverishment of the blood. The chief symptoms consist of a pale and waxy, or a sallow hue of the countenance and integuments generally; with a blanched appearance of the lips and tongue and inside of the mouth. The conjunctivæ are clear. The pulse is frequent, small, and quick—sometimes very quick. Attacks of frontal headache are often complained of; or there is an almost constant pain at the top of the head. Mental depression is generally a prominent symptom. And then we find more or less loss of appetite, with indigestion and flatulence and irregular action of the bowels; a free secretion of pale limpid urine; and great general debility with languor. There is often an enlargement of the thyroid gland; and with or without this an unnatural prominence of the eyeball (*exophthalmos, proptosis oculi*), producing a staring appearance as if the orbits were too small for their contents. The nervous sensibility is mor-

bidly increased; and muscæ volitantes, with scintillations, are complained of. The temperature of the surface and extremities is below the normal standard. There may be œdema of the ankles, with or without albuminuria. While in women, the catamenial periods have either temporarily ceased; or they recur with regularity, but the fluid is pale and watery and usually scanty. Vaginal leucorrhœa is very common.

Then, in addition to the foregoing, the arteries in the neck are to be seen beating violently. The pulsations of the aorta can be readily felt just below the lower end of the sternum, by pressing on the stomach. It will likewise be observed that even moderate mental excitement or bodily exertion is attended by a sense of sinking, with fainting or syncope. There is also palpitation with hurried breathing. This panting dyspnœa is easily explained on the supposition that the blood-cells are the carriers of oxygen; for allowing that these corpuscles are diminished, it necessarily follows that increased respiratory efforts must be established if the due oxygenation of the blood is to be maintained.

The suggestion has been made, that anæmia not only causes the respirations to be quickened, but that hurried breathing induces at length poverty of blood. The fact that housemaids in the lofty houses of large cities suffer thus, may perhaps be explained on this view. I have certainly found that steel alone fails to cure these cases. But when it is given during a rest of five or six weeks then speedy improvement takes place; the patient herself, in describing her progress towards recovery, often saying—"I seem to have more breath now."

On practicing auscultation over different parts of the vascular system, certain inorganic murmurs can be heard. At the base of the heart, a soft systolic bruit or bellows-sound will frequently be detected; which may be traced distinctly up the aorta, and in the subclavian and carotid arteries. In some cases, an intermittent murmur, synchronous with the beat of the pulse, may be heard in all the large arteries. By placing the stethoscope over the large veins at the side of the neck, and especially in the right supra-clavicular space, a continuous humming, or cooing, or even whistling sound—the *bruit de diable*—will be heard; a sound which is partly caused, as Dr. Ogier Ward first pointed out, by the descent of attenuated blood through the great cervical veins. Too much importance, however, must not be attached to this venous murmur. By making moderate pressure with the stethoscope it may be detected, though probably in a less degree than in anæmia, in the great majority of healthy individuals, and almost always in children and young women.

Where anæmia is of long continuance general atrophy sets in; together with dropsical effusions, great dyspnœa, diarrhœa, and profuse sweating. The pulse gets very frequent, irregular, and weak. The heart's action is rapid and palpitating. At times there are painful spasms or convulsions. Moreover, the low degree of vitality which exists, renders the system unable to resist the influence of any morbid poison to which it may be exposed. When death occurs it may take place gradually from exhaustion; or more suddenly from syncope, convulsions, or coma. The tissues will afterwards be found pallid and flabby; the heart and vessels will be comparatively bloodless. But no traces of structural disease can be detected in cases of simple anæmia; with the exception, that the thyroid gland, and possibly the spleen, may be much enlarged.

Treatment.—Occasionally we meet with such serious cases, that we can for a time only trust to the most careful nursing, to the guarded exhibition of some preparation of cinchona, to the very frequent administration of wine or brandy, to the use of milk or cream, or raw eggs or broth (F.

1, 2, 3, 17, &c.), to the application of warmth, and to the strict maintenance of the recumbent posture—possibly on a water-bed. Nutrient enemata of cream and beef essence and wine may sometimes be needed, especially if the stomach cannot retain food. Otherwise, it is better not to attempt too much at first. These are instances, commonly, where there has been either gross neglect, or where the morbid state has arisen from some excessive loss of blood. Generally speaking, the patient is seen before matters have arrived at this very distressing stage. We then have the satisfaction of knowing that removal of the cause, the use of tonics and stimulants, the avoidance of all excesses, the due observance of mental and bodily repose, together with a suitable diet, will effect a cure. The remedies we particularly trust to are the various preparations of iron. If it be thought desirable to give metallic iron in a state of fine division, the practitioner will order the officinal ferrum redactum (F. 394); one grain of which is said to be equal to five grains of the citrate. This reduced iron is also valuable when combined with quinine (F. 380), or with aloes and nux vomica (F. 404). It ought only to be taken with the meals, as it otherwise is apt to cause disagreeable eructations of hydrogen. Then there is the citrate of iron and ammonia, which can often be borne when other preparations will not be tolerated. It may be prescribed with ammonia and citrate of potash (F. 403); or with cocoanut oil, brandy, strychnia, &c. (F. 391, 392, 394, and 408). Amongst other preparations also, it is well to remember the citrate of iron and quinia (F. 380); the phosphate of iron (F. 405); the tincture of perchloride of iron (F. 392, 402); the officinal pill of carbonate (saccharated) of iron and the old officinal compound mixture of iron. The British Pharmacopœia, moreover, contains a formula for an "Aromatic Mixture of Iron," which is remarkable as forming about as inert a preparation as could well be concocted. It is only mentioned here that time may not be lost by prescribing it.

Attention should always be paid to the state of the bowels. If, as often happens, there is constipation, this condition will probably be aggravated by the use of steel. It becomes necessary, therefore, to avert this trouble by the combination of some aperient with the iron, or by the use of any mild cathartic, or by the employment of enemata. Steel and aloes (F. 154, 404); or this metal with Glauber's salts (F. 180, 181); or pepsin and aloes (F. 155); or either of the officinal extracts of aloes; or such remedies as magnesia, senna, sulphur, castor-oil, &c., are sure to answer the purpose of the practitioner without proving too active for the patient.

The nervous system often requires to be calmed. This is done partly by the tonics already advised. But remedies such as ether, spirit of chloroform, Indian hemp, &c., are frequently needed in addition. As a rule, opium is best avoided; but there are exceptional cases where it proves of great value. When there is much restlessness, soothing doses of henbane or hop are called for; and when much palpitation, small doses of aconite do good (F. 325, 330, 342). Then plain nourishing food must be allowed as freely as it can be assimilated; beginning with milk and raw eggs and beef tea, and port or Bordeaux or Hungarian wine, until we can advance to fish or poultry or mutton, cod-liver oil, and unadulterated bitter ale or even good stout. Where the gastric juice is deficient in quantity, some preparation of pepsin will often work wonders (F. 420). A trial of one of the preparations of oxygen is also often advisable, particularly if there be much shortness of breath (F. 370). The only other curative agents to be remembered are outdoor exercise, short of fatigue; the respiration of pure air; and cold bathing, particularly in sea-water. Under the judicious use

of such restoratives, the bloodlessness and all its resulting formidable symptoms entirely disappear; though it must be remembered that as it takes a longer time to replace the red globules than the other constituents of the blood, so the remedies require to be persevered with for many weeks.

Transfusion of blood is said to have been successfully practiced by some French physicians, during 1868, in two or three cases of severe anæmia. The only instance which I have found reported in the journals, ended unfavorably. The patient, who was dying from anæmia without any apparent organic disease, had blood from healthy subjects injected into his veins on four occasions by Professor Béhier. The quantity thus introduced within the space of a fortnight amounted to thirty-three ounces. At first the man seemed to rally; but at a later period he was observed to exhibit symptoms of pulmonary and cerebral congestion. He died a few hours after the fourth operation. No morbid alterations of any importance were found on making the post-mortem examination; only the organs were pale, flabby, and anæmic. It was remarked that the blood, which at first was quite watery and poor, had grown much thicker under the process of transfusion. The question naturally arises whether the injection of healthy blood can sufficiently excite the blood-forming organs to such a normal action as to keep up the supply of nutritive material. At present, the answer would seem to be in the negative.

In anæmia dependent on too severe mental occupation, the phosphate of iron or zinc, or the phosphoric acid in some tonic infusion (F. 376, 405, 414), together with cod-liver oil, do much good. In such cases the blood gets poor and watery to a marked degree; and hence requires to be enriched by rest from intellectual pursuits, a diet more than ordinarily rich in nitrogenous materials, as well as by the employment of chalybeates. Coffee, wine or bitter ale, and even tobacco in great moderation will prove useful. Overwork of the brain produces undue destruction of the nervous tissue, and consequent deterioration of the vital force, as certainly as too prolonged or too intense muscular action, or as an insufficient supply of nourishment.

Invalids from tropical climates very often suffer from anæmia. This will possibly be the result of long residence in malarious districts; or it may be the sequel of hepatitis, fever, dysentery, and cholera. In the treatment of remittent and intermittent fevers, &c., in India, bleeding and mercury and purgatives and low diet often constitute the remedies. Leeches appear to be employed by dozens at a time; and of course they must usually produce severe and protracted anæmia. Sir James Ranald Martin mentions several cases where hundreds of these bloodsuckers had been used during an illness. One gentleman, who was so unlucky in 1855 as to fall from his horse, had twenty-two dozen applied at once; while another was invalided for life, after the employment of at least three thousand leeches in six years.* Necessarily, in patients thus treated, the blood remains impoverished, and the whole system enfeebled, for a very long time after the European has returned home: in fact, the disease, whatever its nature, could hardly be more injurious than the remedy. Amongst the symptoms by which anæmia is especially characterized in tropical invalids, we find repeated hemorrhages, passive congestions of the thoracic or abdominal viscera, and abdominal neuralgic pains. Let the nature of these signals of debility be mistaken, or allow depletion in any form to be resorted to, and very grave

* The Influence of Tropical Climates in producing the Acute Endemic Diseases of Europeans. Second Edition, p. 652. London, 1861.

mischief will result. The only remedies of any avail are good food, ferruginous tonics, a complete holiday, and a residence in the country air. Sir Ranald Martin particularly recommends a visit to the Highlands of Scotland, a suggestion not to be forgotten.

A peculiar form of anæmia, technically known as CHLOROSIS [*Χλωρὸς* = green], frequently affects young women about the age of puberty. According to some authorities this disease has its origin in the nervous system; the disturbance of the digestive, circulatory, and uterine functions being the effect of this morbid action. Without entirely denying this theory, I am sure that many cases which have come under my notice have been dependent on, or at least very intimately connected with, disordered menstruation, in combination probably with certain sexual causes. The nervous system has suffered equally with the circulating and the muscular, just as all the tissues become affected when the blood is too poor to nourish them properly. But this suffering has appeared to me to stand in the relation of effect instead of cause. In chlorosis, the red corpuscles are pale and small, being also diminished in number, even to one-third of the normal standard; while the proportion of albumen in the liquor sanguinis is natural. The fibrin, in some instances, has been found to be increased, though no trace of any inflammatory action was to be discovered in the system. In chlorotic women the waxlike hue of the countenance is remarkable. Indeed, so peculiar is this pallor of the skin, that the disease is popularly spoken of as the *green sickness*. The subjects of it present certain prominent symptoms. Thus, they have a deficient or depraved appetite, gastric dyspepsia, inactivity of the liver, offensive breath, and constipation; the urine is abundant and pale and of low specific gravity, while the bladder is irritable so that it has to be frequently emptied; the integuments are puffy, perhaps œdematous; the mucous membranes have an exsanguine and flabby appearance; the tongue is flaccid and indented at the edges by the teeth, while the gums have a marked pallor and are inclined to be spongy; the pulse is frequent and small and quick; and the menstrual discharge is absent, or it appears at irregular times and is pale and scanty. There is an indisposition for all mental or bodily exertion; with vertigo, headache, intolerance of light and noise, palpitations, pain in the left side over the false ribs, backache, and various hysterical affections. The same cardiac and vascular murmurs are to be detected as in anæmia; and not unfrequently also the same enlargement of the thyroid gland, with the peculiar protrusion of the eyeballs.

These phenomena are developed gradually, and often after there have been symptoms of disordered menstruation for some little time. Dysmenorrhœa and leucorrhœa are very common precursors of chlorosis. In cases where the heart's action has become much enfeebled, there is a fear that syncope may occur suddenly and prove fatal. I have seen two or three instances, also, in which all the symptoms have rapidly become aggravated, a condition of great drowsiness has followed, and the patients have died comatose at the end of a few hours.

The cure of this affection is not usually difficult. Perfect health may generally be restored by attention to the diet and mode of living, and by a course of chalybeates. I say "generally," because of those rare instances just alluded to, where severe symptoms set in suddenly, and death takes place as if from cerebral effusion. When we administer iron in cases of chlorosis and anæmia, it acts as a general tonic; while in all probability it becomes asimilated and enters directly into the formation of the blood-globule, increasing the amount of hæmatin. The soluble

preparations of steel are not so much more active than the insoluble, because the latter get oxidized in the alimentary canal. They must, however, be administered in a state of minute subdivision. According to some authorities, the more astringent the chalybeate, the greater its power; but this view is opposed to the results of my own observation.

4. LEUCOCYTHÆMIA.—This remarkable affection may be best defined as a morbid state of the blood, in which the white corpuscles are greatly increased in number, while the red cells are much diminished. It is always connected with hypertrophy of one or more of the lymphatic glands, or of the spleen.

Leucocythæmia has been particularly investigated—or, to speak more fairly, discovered—by Hughes Bennett and Virchow. The latter named it *Leukhæmia*, or white blood; an objectionable term, inasmuch as the blood is not white, but of its usual color. Dr. Bennett has, therefore, substituted the word *Leucocythæmia*, from λευκὸς = white + κυτος = a cell + αἷμα = blood; literally white-cell blood. The first example of it was described by Dr. Bennett, in October, 1845, who regarded it as an instance of "suppuration of the blood without inflammation." It occurred in a case of hypertrophy of the liver, spleen, and lymphatic glands. Six weeks subsequently Virchow published the notes of a similar case; and gave what cannot but be deemed a more correct explanation of its nature. For he showed, that the bodies which Dr. Bennett regarded as pus-globules resulting from some process of development in the blood itself, were really the colorless corpuscles of the blood very greatly increased in number.

Symptoms.—Very little is known of this disease or its causes at present. It occurs generally in adults; and decidedly is more frequent in advanced life than in the young. In cases where it has been found to exist, the majority of the patients have suffered from an unusual pallor, like that of anæmia; from great and progressive emaciation, with marked debility; from more or less swelling of the abdomen, owing to enlargement of the spleen, or liver, or both; from disordered respiration; as well as from increasing prostration and emaciation, gradually ending in death. In many cases, moreover, there has been obstinate diarrhœa; there have been repeated attacks of hemorrhage in some form or other, but especially epistaxis; and there has been much suffering from nausea, jaundice, fever, and loss of appetite. Frequently, towards the close, there will be found œdema of the extremities; together with dropsical effusions into the pleuræ, pericardium, or peritoneum. Ascites is perhaps more common than other forms of dropsy; the fluid effused being especially abundant when there is great splenic enlargement.

The analyses which have been made of the urine in leucocythæmia are few in number. But so far as those which have been published can teach us anything, they show that the uric acid is always augmented. This increase occurs absolutely as well as relatively to the urea. Thus in health, the proportion of uric acid to urea is about 1 : 60; while in the disease under consideration it has been found even higher than 1 : 20. The urea itself is present in greater proportions than in health, as is the sulphuric acid; while the chlorine is diminished. Leucin has also been detected, as it has in other morbid states of the system; though this substance is never present in healthy urine.

Diagnosis.—If we examine the blood of a patient affected with the symptoms just described, no mistake can be made with regard to the nature of the disease. On placing an ounce or two of leucocythæmic blood, which has been freed from fibrin, in a narrow glass, the red corpuscles sink to the

bottom, while the upper part of the mass looks like milk. This latter appearance is due to the colorless corpuscles; and it may be distinguished from that caused by fat, owing to the circumstance that it is not removed by ether. In extreme cases portions of the blood resemble pus.

On looking at the blood microscopically, under a magnifying power of 250 diameters, the yellow and colorless corpuscles are at first seen rolling together; the excess in the number of the latter being at once recognizable, and becoming more evident as the colored bodies get aggregated together in rolls leaving clear spaces between them filled with the colorless ones. A drop of blood taken from a prick in the finger is sufficient for examination. The results of chemical analysis on nine occasions recorded by Dr. Hughes Bennett, show an excess of fibrin and a diminution of blood-corpuscles.

Prognosis.—This is always unfavorable. The marasmus [*Μαραίνω* = to grow lean] generally increases steadily. All that can really be done is to try and put off the fatal termination: in this attempt we may be successful for one or two years.

Pathology.—In health the ratio of colorless to red corpuscles is about 1 : 373 (Donders and Moleschott); whereas in the disease under consideration they often stand to the red corpuscles in the high proportion of 1 : 3. According to many physiologists the red corpuscles are formed from the colorless ones by the direct transformation of the latter into the former. From numerous observations, however, Dr. Bennett believes with Wharton Jones that the colored disk is merely the liberated nucleus of the colorless cell. The opinion, first promulgated by Hewson, that the blood corpuscles were derived from the lymphatic glands, has been generally rejected. But after a careful consideration of the subject, Dr. Hughes Bennett confirms this view. The conclusions this gentleman has drawn, after much laborious research, are these: "1. That the blood-corpuscles of vertebrate animals are originally formed in the lymphatic glandular system, and that the great majority of them, on joining the circulation, become colored in a manner that is as yet unexplained. Hence the blood-corpuscles may be considered as a secretion from the lymphatic glands, although in the higher animals that secretion only becomes fully formed after it has received color by exposure to oxygen in the lungs. 2. That in mammalia the lymphatic glandular system is composed of the spleen, thymus, thyroid, suprarenal, pituitary, pineal, and lymphatic glands. 3. That in fishes, reptiles, and birds, the colored blood-corpuscles are nucleated cells, originating in these glands; but that, in mammals they are free nuclei, sometimes derived as such from the glands, at others developed within colorless cells. 4. That in certain hypertrophies of the lymphatic glands in man, their cell elements are multiplied to an unusual extent, and under such circumstances find their way into the blood, and constitute an increase in the number of its colorless cells. A corresponding diminution in the formation of free nuclei, and consequently of colored corpuscles, must also occur. This is leucocythæmia."*

From the foregoing it follows, that one or more of the blood-glands will be found enlarged in the disease under consideration. Most commonly this change is discovered in the spleen, liver, and lymphatics; less frequently the thyroid body and the suprarenal capsules are affected. Sometimes the spleen has weighed as much as nine pounds; but it must not be inferred that this organ cannot become greatly enlarged without the blood being leucocythæmic. The liver has been found to be hyper-

* Clinical Lectures on the Principles and Practice of Medicine. Fourth Edition, p. 891. Edinburgh, 1865.

trophied, or cirrhosed, or cancerous; though in some instances it has been perfectly healthy. The condition in which the increased proportion of colorless corpuscles appears to be dependent upon an affection of the lymphatic glands, has been designated *Leucocytosis* by Virchow, in contradistinction to that due to splenic hypertrophy. But the foregoing remarks will show that this is a very unnecessary distinction; and one which, as it seems to me, can only lead to confusion.

Treatment.—The remedies which would appear to promise the most success, for a time, are certain tonics; especially, perhaps, bark, iron in various forms, and quinine. Iodide of potassium and the chloride of potassium have been fruitlessly tried. As there is undoubtedly an increased metamorphosis of nitrogenous tissues in this disease, so plenty of good animal food will be indispensable; while cod-liver oil may often no doubt prove beneficial. In the choice of subordinate restoratives and drugs, the practitioner must in a great measure be guided by the prominent symptoms in each case; always taking care to check any attacks of hemorrhage or diarrhœa as soon as they arise.

5. PIARHÆMIA.—Healthy blood contains, on an average, somewhat less than two parts of fat in a thousand; and it probably exists in combination with potash or soda, as a kind of soap. Hence on a minute examination of normal blood, no oil-globules are to be seen. Milkiness of the serum or fatty blood [*piarhæmia*, from *Πῖαρ* = fat + *αἷμα* = blood; *pioxæmia*, from *Πίων* = fat; or *lipæmia*, from *Λίπα* = fat]; is met with under certain circumstances in disease, and hence demands attention. Its physical causes are two, viz,, free fat, and molecular albumen.

In the first place, piarhæmia is a *physiological* result of digestion, pregnancy, lactation, and hibernation. During the process of digestion, the lactescence of the serum is said by Becquerel and Rodier to begin about two hours after the ingestion of aliment, and to continue for two or three hours. The serum is found to be turbid and opalescent and semi-opaque; a transitory condition that is due to the absorption of the fatty matters of the food, which have been formed into an emulsion by the pancreatic juice and absorbed as such in the duodenum. Examined microscopically, this constitution of the serum is seen to be caused by the presence of a large number of fat-globules and of molecular granules of albumen. According to Christison and Lecanu, the passage of the chyle into the blood renders the serum turbid; such turbidity lasting until the insoluble fatty matters—olein, stearin, and margarin—enter into combination with the free soda of the blood, and become converted into the oleic, stearic, and margaric acids.

Secondly, lactescent serum is a *pathological* result of disease. The cases in which its occurrence has been noted are diabetes, chronic alcoholism, dropsy, jaundice, nephritis, hepatitis, pneumonia, and especially Bright's disease. In an interesting case of piarhæmia accompanying acute diabetes, recorded by Dr. Charles Coote, which ran its course very rapidly and was attended with great prostration, the blood after death was found fluid and homogeneous and of a dull-red color like raspberry cream; while in a few seconds it separated into two distinct portions, the supernatant layer being of the color and appearance of thick cream, while the subjacent portion presented the appearance of fluid venous blood. The creamy layer was certainly nothing but free fat, for it was wholly taken up by ether.

Various explanations have been given of the occurrence of fatty blood in disease. Formerly, pathologists attributed it to the passage of un-

altered chyle into the circulation; an explanation which, though in some measure true, was shown by Hewson to be insufficient, since he observed this condition in many instances where the patients had taken little or no food for many days. Raspail maintained that the fat was set free in the blood for want of a free alkali to hold it in the form of a soap. Dr. Babington appeared to look upon piarhæmia as a fatty degeneration of the albumen of the blood. Rokitansky thinks it is often due to fatty degeneration of the colorless corpuscles, which are previously formed in excess, so that it is to be regarded as a modification of leucocythæmia; but he also admits the direct introduction of fat into the blood, as well as the liberation of combined fat contained in it, to be possible causes. Virchow considers it as dependent upon the non-combustion of fat, and its consequent accumulation in the blood; while he believes the presence of molecular albumen to be only a secondary phenomenon, the slow saponification of the excess of fat abstracting from the albumen of the blood the alkali required to keep the latter in solution. And lastly, Dr. C. Coote, from a comparison of all the facts which have been published upon this topic, concludes:* 1. That piarhæmia consists in an excess of saponifiable fat in the blood, and not in the mere liberation of fat from its combinations. 2. The excess of fat may be the result of two causes—viz. (*a*) the excessive ingestion of fat, as in piarhæmia during digestion; (*b*) the diminished elimination of the same, as in hibernation and pulmonary diseases. 3. Fat, if directly ingested, may enter the blood with the chyle through the thoracic duct; though from the consideration of the case recorded by Dr. Coote, it seems that it may also be elaborated in and absorbed directly from the liver. 4. Piarhæmia is not a result of diabetes mellitus, for either may exist without the other. 5. The pathology of blood milky from molecular albumen must be considered as still almost wholly negative. Though probably never an independent affection, yet it is not a mere accidental occurrence of piarhæmia. Its apparent relation to albuminuria seems to point to some organic change in the constitution of the plasma of the blood itself.

6. GLUCOHÆMIA.—The excretion of sugar by the kidney, constituting a disease known as diabetes, or diabetes mellitus, or saccharine diabetes [*diabetes*, from *Διὰ* = through + *βαίνω* = to move; *melituria*, from *Μέλι* = honey + *οὖρον* = the urine; *glucosuria*, from *Γλυκὺς* = sweet; *glucohæmia*, from *Γλυκὺς* + *αἷμα* = blood]; has attracted considerable attention since the time (about the year 1660) when Thomas Willis first observed the saccharine condition of the urine in this affection. More than a century later (1774) Matthew Dobson discovered, that the blood as well as the urine contains sugar in this disorder; from which he inferred that the saccharine matter is not formed in the kidneys, but only eliminated by them. Four years afterwards (1778), Cowley succeeded in isolating the saccharine principle. John Rollo next taught (1796) that an animal diet lessens the amount of urine excreted, as well as the quantity of sugar. Then (1815) Chevreul learned that the sugar differs from cane sugar, and resembles that of the grape; while ten years subsequently (1825) Tiedemann and Gmelin found that starch during its passage along the alimentary canal is transformed into sugar. Henceforth, the only justifiable opinion was to this effect, viz., that the sugar formed in the stomach and alimentary canal, from the starchy and saccharine elements of the food, instead of being converted into other compounds, was absorbed and

* The Lancet. London, 8th and 15th September, 1860.

excreted by the kidneys. Dr. McGregor (1837) positively detected sugar in the serum of the blood, in the saliva, in the stools, and also in the vomited matters of diabetic patients. It necessarily followed that the treatment of diabetes consisted in allowing a diet free from substances which could be converted into saccharine matter; and it is certain that thus the general symptoms were frequently alleviated, while the amount of sugar which could be detected in the urine was usually considerably diminished.

We now come to what may be appropriately called the physiological epoch in the history of diabetes. Just twenty-one years have elapsed since M. Claude Bernard asserted (in 1848) that animals, as well as vegetables, possess a sugar-forming power. Previously it had been the universal belief, that all the sugar found in the system was derived from the starchy and saccharine elements of the food. But Bernard's elaborate researches on what he has called the glycogenic function of the liver, were destined to direct attention to a new field. This eminent physiologist, while allowing that sugar could be formed during digestion, and that a certain portion might become absorbed, has yet further taught that this substance is a normal secretion of the liver. Thus, if a dog be fed for some time on a purely animal diet and then killed, the blood of the portal vein or that going to the liver will be found free from sugar; whereas the blood of the hepatic veins or that flowing from the gland, will be highly charged with it. He also proved that sugar may be formed in abnormal quantities by irritating the eighth pair of nerves at their origin in the fourth ventricle; while section of both these nerves suspends the sugar-forming function of the liver. In health the sugar produced by the liver passes into the hepatic veins, the inferior vena cava, the right cavities of the heart, and thence by the pulmonary artery to the lungs, where it is consumed. When abnormally increased, the lungs cannot excrete all of it; and hence part passes off by the kidneys, producing diabetes. But although the division of the pneumogastric nerves has the effect just mentioned, yet the sugar-forming power of the liver is restored by irritating their upper cut ends; and diabetes can be produced just as if the origins of these nerves were excited. On the other hand, the application of an irritant to the lower ends of the divided nerves gives no result. Bernard therefore concludes that the nervous power which excites the liver to secrete the saccharine matter, does not originate in the brain, to be carried by the pneumogastrics to the hepatic organ; but rather that the stimulus proceeds along these nerves to the brain, and thence by reflex action is transmitted to the liver. Further consideration led to the opinion that in health the reflex action which excites the hepatic sugar-forming function originates in the stimulus given by the air we breathe to the pulmonary branches of the pneumogastrics. He believes, in short, that at each inspiration these branches receive a stimulus which is transported through the main trunks of the nerves to the brain, and is thence reflected by the spinal cord and the thoracic portion of the sympathetic to the liver. Experiments in proof of the foregoing showed, that when the function of respiration is stimulated—as by the exhibition of ether or chloroform—sugar temporarily appears in the urine. Again, it is supposed that just as the lungs act by reflex influence on the liver, so increased action of the liver acts upon the kidney; and hence that sugar produced in excess in one organ is excreted by the other.

Pursuing his investigations still further, Bernard was led to the conclusion (announced in March, 1857) that the liver secretes a substance which is changed into sugar by some ferment, instead of forming the sugar directly. This glycogenic or sugar-forming substance, on being separated

from the liver, presents the characters of hydrated starch; and when it comes into contact with the supposed ferment in the blood, the transformation is effected. The sugar in the blood, when the latter reaches the lungs, is decomposed by the oxygen and disappears; so that the liver produces the glycogen which forms the sugar, whilst the lungs are the organs in which the latter is consumed. Of course during health, only the blood which circulates between the liver and the lungs contains saccharine matter; and, therefore, whenever this material is found in the circulation generally, it must be the consequence either of excess of hepatic power, or of diminished pulmonary action.

In July, 1857, Dr. Harley published* his views on the pathology of diabetes, and showed that while agreeing in the main with Bernard, he yet doubted the conclusion of this physiologist that in the normal state respiration is the excitor of the glycogenic function of the liver. His experiments seem to indicate that if the pneumogastric carries the stimulus to the brain, to be thence transmitted by the spinal cord and splanchnic nerves to the liver, the point of departure of the stimulus is probably in the liver itself; and that the cause of the reflex action may originate in the stimulating effect of the portal blood upon the hepatic branches of the pneumogastric. Thus, if the stimulating effect of the blood of the portal vein be imitated by injecting into that vessel ether, chloroform, alcohol, or ammonia, the liver is excited to secrete an excess of sugar, and the animal operated upon is rendered for a time diabetic. This sugar belongs to that class of which grape sugar is the type. For just as in the vegetable kingdom there are two great types of sugar, cane and grape; so in the animal kingdom we find the representative of the first in milk sugar, and of the second in liver sugar. Dr. Harley also confirms the opinion of M. Chauveau that the sugar is not destroyed in any appreciable quantity during its passage through the lungs. On the contrary, he believes that this agent, formed by the liver, goes to the support of the general system; and hence that, in health, it disappears from the general circulation during its transit through the minute capillaries of the different tissues.

These theories may possibly have to be modified by and by, owing to several important analyses of the blood by Dr. Pavy. This gentleman (in papers communicated to the Royal Society in 1858 and 1860) states, that although the blood collected from the right side of the heart after death, contains abundance of sugar, yet when it is removed from the same part by catheterism during life, it presents but a trace. Inferences, therefore, that have been drawn of the ante-mortem state from post-mortem examinations must be abandoned. Very slight causes—*e. g.*, such as interfere with the breathing—determine the presence of a large quantity of sugar in the circulation during life. As the mode of examining the blood hitherto adopted has led to false inferences, so the plan pursued with regard to the liver has had the same effect. The liver forms a material which has been called the glycogenic substance. But then, as Dr. Pavy does not regard this material as a sugar-forming substance under physiological conditions, he named it hepatin, as belonging to the liver. More recently, to avoid an unnecessary multiplication of names, he has adopted the term "amyloid substance;" a proper step, since in its chemical properties this material is nearly allied to starch, or more closely to vegetable dextrin.† This amyloid substance, or zoamylin, or animal starch, or liver starch, is chiefly

* The British and Foreign Medico-Chirurgical Review, vol. xx, p. 191. London, 1857.

† Researches on the Nature and Treatment of Diabetes, p. 26. London, 1862.

derived from saccharine matter consumed as food, and from the metamorphosis of starch into sugar in the alimentary canal. The sugar is carried by the portal system to the liver, detained there, and converted into amyloid substance: the latter then being found in the hepatic cells. But what purposes it serves in the animal economy are at present unknown; though Dr. Pavy is inclined to believe that it is destined to pass into the intestinal canal through the biliary ducts, and that it will be found entering both into the formation of bile and the production of fat. The important point to remember, however, is this: that although under natural circumstances during life, the amyloid substance resists transformation into sugar, yet after death such a change is rapidly effected. An infinitesimal proportion of sugar is normally present in the blood during life, as well as in the urine. But an amount which is easily recognized by simple tests results only from disease, or naturally after death. So that diabetes is, in fact, nothing more than the exaggeration of the scanty glycogenesis of health; the sugar from the alimentary canal, instead of being transformed into amyloid substance in the liver, passing through this gland into the general circulation, whence it is sure to appear in the urine. And thus we can understand that the diabetic condition is sometimes only temporary, and that it may be caused by certain articles of saccharine or starchy food when taken in great excess. Abnormal states of the circulation, and probably of the blood, also lead to a similar production. Certain altered conditions of the nervous system likewise occasion an extensive collection and discharge of sugar in the body. Injury to particular parts of the sympathetic rapidly produces a strongly diabetic state, and so does the inhalation of chloroform or ether. And lastly, the introduction of carbonate of soda largely into the circulation altogether prevents this effect.

Although my skill in physiological chemistry is not sufficient to enable me to give any satisfactory solution to the difficulties thus raised, yet I believe that Dr. Pavy's opinions are becoming much more generally adopted than they were ten or twelve years ago. Nevertheless, Dr. Harley still appears to challenge their accuracy; and in many important points this gentleman supports Bernard's views on the glycogenic functions of the liver.* So also, Dr. Thudichum has objected to Dr. Pavy's method of analysis, and has expressed a strong opinion in favor of the views which were current prior to the publication of this gentleman's opinions.† But then Dr. Pavy has forcibly replied to the objections of Drs. Harley and Thudichum, and has combated many of them with much effect.‡ More important still, Dr. Robert McDonnell has repeated the experiments of Dr. Pavy and has confirmed his conclusion, that during life and health, little, if any, of the amyloid substance of the liver is converted into sugar. This evidence is the more significant because Dr. McDonnell has not simply reproduced Dr. Pavy's experiments, but has performed many of them with various modifications. Albeit the result has been, that the soundness of Dr. Pavy's teachings has not been shaken.§ So also on the continent, Schiff (writing in 1866) shows how completely Pavy's views have been confirmed by MM. Meissner and Jaeger. It follows, therefore, from the remarkable history of this affection, that although the student ought to

* Proceedings of the Royal Society of London, vol. x, p. 289. London, 1860.

† British Medical Journal, p. 206. London, March 17th, 1860.

‡ Medical Times and Gazette, p. 379. London, April 15th, 1865. Also, On the Nature and Treatment of Diabetes. Second Edition, p. 83. London, 1869

§ Observations on the functions of the Liver, more especially with reference to the formation of Amyloid Substance, or Animal Dextrin, and the ultimate destination of this substance in the Animal Economy, p. 3. Dublin, 1865.

postpone coming to any positive decision on the subject—that as there is doubt he must suspend his judgment, still he will be justified in showing an inclination towards the views of Dr. Pavy. The few points which may almost be taken for granted are these: (1.) The liver cells, among other offices, have to perform two very important functions, viz., the secretion of bile, and the production of amyloid substance or animal dextrin. This amyloid substance, discovered by Bernard in the liver, is known also to exist normally in other tissues. It differs from the material described by Virchow as causing amyloid degeneration of various organs, inasmuch as it is free from admixture of azotized matters; whereas the substance found by Virchow is in more or less complete union with nitrogen. (2.) The amyloid substance of Bernard is found in greatest abundance in the hepatic tissue about six hours after a full meal; from this time diminishing steadily and gradually if the animal be not fed. A diet containing much starch and sugar greatly increases the amount of amyloid substance formed in the liver (McDonnell and Pavy). And (3.) Diabetes is the result of some defective action of the liver. What this defective action actually consists of, and what are the circumstances which give rise to it, still remain problems to be solved. It has long been known, as already mentioned, that a temporary diabetes is produced by pricking the floor of the fourth cerebral ventricle; by injuries to the base of the brain and cerebellum; by over mental work and anxiety; as well as by derangements of the stomach. Moreover, Dr. Pavy proved, in 1859, that a like condition ensues on injuring certain portions of the sympathetic—amongst other parts, the superior cervical ganglion. But how these various operations act can scarcely be surmised at present.

For the sake of convenience, as well as in accordance with custom, the symptoms and diagnosis and treatment of this affection will be considered in the section on renal disorders; though after the previous remarks it is hardly necessary to say, that the occurrence of saccharine urine is only a prominent symptom of one or more diseases.

7. URÆMIA.—The urine is one of the chief depurating secretions by which the normal condition of the blood is maintained. When, from any cause, the function of the kidneys becomes impaired or suppressed, urea (furnished, in great part at least, from the metamorphosis of the worn-out tissues, uric acid perhaps standing in the relation of an intermediate substance) and other substances which these organs ought to remove from the system are no longer eliminated, and they therefore accumulate in the blood, producing that morbid condition known as uræmia [from *urea*, + *αἷμα* = blood].

The important amount of work performed by the cells of the uriniferous tubes is very clearly shown in the following table by the Rev. Professor Haughton, of Trinity College, Dublin.* It exhibits the *natural daily constants of the urine of the average man;* the analysis giving results corresponding with those generally obtained, save that the uric acid is much below the average—scarcely one-half of the medium quantity discharged. From an examination of the table we cannot but infer that suppression of the renal excretion is one of the most dangerous events which can happen:

* The Dublin Quarterly Journal of Medical Sciences, vol. xxxiv, p. 288. Dublin, 1862.

Excretion. Weight of Body, 145 lbs.	Per day.	Per day per lb. of body-weight.
Urine.	52.62 oz., or 23021.25 grs.	2.84 drs. or 155.348 grs.
1. Urea,	493.19 grs.	3.331 grs.
2. Uric acid,	3.15 "	0.021 "
3. Phosphoric acid,	32.36 "	0.218 "
4. Sulphuric acid,	31.55 "	0.214 "
5. Chlorine,	106 56 "	0.673 "
6. Extractives,	175.27 "	1.183 "
7. Balance (viz., inorganic bases),	115 73 "	0 827 "
Total solids,	957.81 grs.	6.467 grs.

The quantity of urea excreted by the kidneys in the twenty-four hours is influenced by many circumstances. Thus it is increased by intellectual labor, by animal food, and by age—the young and old excreting less than individuals in the prime of life. There is also an increased amount in many diseases: *e. g.*, the continued and eruptive fevers, inflammations of internal organs, ichorhæmia, and diabetes. On the contrary, there is a decrease in chronic diseases accompanied by impaired nutrition, in convulsions, in some forms of paralysis, in cholera, in albuminuria, and in many fatal disorders towards their close. Of course this diminution may depend either on lessened production, as when the diet consists chiefly or exclusively of vegetable matter; or it can be owing to arrested elimination—to lessened excretory activity of the kidneys, as happens in Bright's disease, &c.

The term *uræmic intoxication* is employed to denote that peculiar kind of poisoning which results from the non-elimination of urea and other urinary constituents by the kidneys, and the consequent accumulation of these materials in the blood. As we shall presently see, considerable discussion has taken place as to whether the simple accumulation of urea is sufficient to account for the symptoms; Frerichs asserting that the real poisonous agent is carbonate of ammonia resulting from the decomposition of the retained urea by some ferment in the blood. Moreover, the opinion entertained by most physiologists, that the kidneys only separate already formed urea and uric acid from the blood seems about to be modified. If recent investigations prove to be correct, it will have to be granted that these organs manufacture as well as select. According to Oppler, a larger amount of urea is present in the blood after ligature of the ureters than after extirpation of the kidneys; whilst, on the contrary, the quantity of creatin in the muscles is greater after the latter proceeding than after the former. And Zalesky, from numerous experiments upon animals, the results of which were published in 1865, has learned that though urea and uric acid are found in the spleen and brain and other organs, still the largest proportion is formed in the kidneys themselves. Whatever conclusion, however, may be come to on either of these points, the significant clinical fact remains, that uræmic toxæmia is induced by whatever interferes with the excreting functions of the kidneys.

The direct effects of this poisoning are seen in a disturbed action of the two great nervous centres—the brain and spinal cord. These centres will be affected either separately or together. Consequently we have three forms of uræmic poisoning: (1.) That in which a state of stupor supervenes rather

abruptly, and from which the patient is aroused with difficulty. It is soon followed by complete coma, with stertorous breathing, as in ordinary poisoning from opium. (2.) The variety in which convulsions of an epileptic character suddenly set in, often affecting the entire muscular system. There is complete insensibility throughout the attack, unless the convulsions are only partial. In this latter case, consciousness remains unimpaired. And (3) that kind in which coma and convulsions are combined.

Albuminuria with uræmia may arise from other conditions than structural disease of the kidney. The convulsions which occur during pregnancy and parturition are supposed by some to be caused by the pressure of the uterus, giving rise to active renal congestion; while others regard them as due to a degradation of the maternal blood. Suppression of urine (*ischuria renalis* or *anuria*) is a frequent and often fatal result of cholera, and of other morbid poisons in the blood. It now and then forms a very dangerous symptom during the progress of fever, and of the exanthemata—particularly scarlatina.

The *phenomena of uræmic poisoning* have usually been ascribed to the direct action of the urea retained in the blood. In 1851, however, Frerichs* advanced the opinion that the toxæmia is not due directly to this retention; but to the conversion of the urea into carbonate of ammonia, through the influence of some particular ferment supposed to be present in the circulating fluid. At first, this view was almost universally accepted; the experiments upon which it was based being regarded as convincing. Moreover, by its light an explanation was apparently given of those cases where individuals in the last stage of renal disease have their blood highly charged with urea, without any uræmic phenomena taking place; simply, it was argued, because the unknown ferment, by means of which the urea is converted into carbonate of ammonia, is absent. But in a short time, when the nature of the ferment had been fruitlessly sought for, doubts began to be thrown on this hypothesis; and more recently it would appear to have been completely overthrown by the labors of Zimmerman,† Hammond,‡ Bernard,§ Richardson,‖ and others. Briefly, it may be said that there are two highly important objections to the views of Frerichs: (1.) That ammonia is not an abnormal constituent of the blood. (2.) There is no proof that urea, while retained in the blood, is converted into carbonate of ammonia. It is true that Frerichs detected ammonia in the breath of persons laboring under Bright's disease; but Richardson, in conducting many examinations of persons in perfect health, failed to find it in only one.¶ The experiments which most strongly tend to support the views of Frerichs, are those performed by Dr. Alexander Petroff, of Dorpat. They

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* Die Bright'sche Nierenkrankheit und deren Behandlung, p. 111. Braunschweig, 1851.

† The British and Foreign Medico-Chirurgical Review, vol. xi, p. 289. London, 1853.

‡ Physiological Memoirs, p. 303. Philadelphia, 1863. Dr. Hammond's essay was first published in the North American Medico-Chirurgical Review, April, 1858.

§ Leçons sur les Propriétés Physiologiques et les Altérations Pathologiques des Liquides de l'Organisme, tome ii, p. 36. Paris, 1859.

‖ Clinical Essays, vol. i, p. 133. London, 1862.

¶ The presence of ammonia in the expired air is roughly proved by holding a glass rod, moistened with hydrochloric acid, before the mouth, and obtaining the thick white fumes indicative of its presence. Or, more correctly, we may test for it by Richardson's process; which consists in moistening a slip of glass with hydrochloric acid, and exposing it to the suspected vapor. If ammonia be present, minute crystals of chloride of ammonium will be formed; and these are readily detected by a microscopic examination, with an object-glass of moderate power.

were chiefly undertaken to disprove the validity of Dr. Oppler's explanations; who, finding that the quantity of urea and extractives in the blood of dogs whose kidneys had been removed was much increased, and that the muscles contained more leucin and creatin than under ordinary circumstances, concluded that uræmic poisoning was caused by the accumulation of products of decomposition of nitrogenous matter within the centres of the nervous system. Very careful experiments appear to have been made by Dr. Petroff on the comparative effects of injections of ammonia into the blood, and the artificial production of uræmia. The following are the general conclusions at which he arrives: (1.) When the kidney function is interrupted, carbonate of ammonia is formed in the blood. (2.) Injection of carbonate of ammonia into the blood produces symptoms strictly comparable to those of uræmia. (3.) The degree in which these symptoms appear, and their character, depends on the proportion of ammonia in the blood, and the circumstances under which it exists there.

Nevertheless, as before mentioned, this attempted confirmation of Frerichs's theory has attracted but little attention. And it is certain that authorities in this country now regard those views which were previously accepted as most probably correct. They have, in addition, been especially upheld by Dr. Hammond; who, after much observation and numerous well-devised experiments, ascribes uræmic intoxication to the direct action of the elements of the urine retained in the blood upon the brain and nervous system, in a manner we do not yet understand. Of these excrementitious elements it is almost certain that urea is the most poisonous. The fact that this substance in large quantity has been found in the blood of persons affected with renal disease in whom no symptoms of blood poisoning were present, at first sight appears to militate against this view. But then we must attribute some share of the mischief to the diminution of the corpuscles and albumen in the blood, as well as to the increase of the creatin and extractives, &c. And while allowing that these variations occur in different degrees in different subjects, so it may also be granted, as Dr. Hammond suggests, that (as with most other poisons) all persons are not alike sensitive to the action of urea. Moreover, in kidney degeneration this salt generally accumulates very slowly; so that the system is thus enabled to tolerate a much greater quantity than when a large amount is suddenly thrown into the blood.

At the same time it is not denied, that after the urea has been secreted by the kidneys it can be readily decomposed into carbonate of ammonia when there is some impediment to the exit of the urine from the system. Thus, in examples of obstruction of the ureter, paralysis of the bladder, stricture of the urethra, &c., the urea being acted upon by some animal matter as a ferment, will undergo decomposition; this change occurring more rapidly even than it does when the urine is out of the body, inasmuch as the secretion is maintained at a higher temperature, and is more supplied with mucus or pus. The decomposed product becoming absorbed, an excess of ammonia will soon collect in the blood; and then symptoms of ammoniacal poisoning (*ammonæmia*) result. The chief of these are a highly ammoniacal state of the breath and perspiration; a glazed appearance of the tongue and fauces; a sallow condition of the complexion; and attacks of rigors. In extreme cases, death may occur preceded by coma. The urine is offensive; it deposits amorphous phosphate of lime with crystals of ammoniaco-magnesian phosphate, and it is often purulent. The reaction is always alkaline, from the presence of the volatile alkali; so that if it be tested with reddened litmus-paper a blue color is produced, which can be removed by the application of gentle heat. When urine exhibits

an alkaline reaction from the presence of a fixed alkali, the blue color communicated by it to reddened litmus-paper is permanent, instead of being destroyed by heat. This simple test is of great importance: for where there is alkalinity from the volatile alkali, the urine has been secreted acid, but has undergone decomposition afterwards. In the case of the fixed alkali, the kidneys have secreted sweet-smelling alkaline urine, in consequence of an increased alkalescence of the blood; this being due either to the consumption of a peculiar food or medicine, or to the existence of some morbid action in the system. In ammonæmia, medical interference often suffices to effect a rapid cure, chiefly by taking care that the bladder is thoroughly emptied with a catheter, that this viscus is washed out every twelve hours with warm water, and that benzoic acid is freely administered.

If now we return from this digression and examine a typical case of uræmic poisoning, we shall find on investigating the history, that there have been certain *premonitory symptoms*. Those particularly to be mentioned are œdema of the face and extremities, drowsiness, snoring during sleep, transitory attacks of mental confusion, partial paralysis of sensation, debility, biliousness, chilliness, nausea, and vomiting, together with occasional sharp attacks of diarrhœa. Moreover, there is often a very fetid condition of the breath, owing to its being charged with ammonia. Then, the *acute symptoms* have been preceded by a chill or distinct rigor, and particularly by complete suppression of urine. Coma or convulsions, or both together, have set in unexpectedly; the coma perhaps being so profound that the patient cannot be roused. The skin is found cold, the complexion of a dusky tinge, the pupils insensible to light and dilated, the pulse slow and infrequent and intermittent, and the respiration obstructed. Frequently, however, the breath is no longer ammoniacal.

Now it is necessary to remember that it is not every case which presents all the symptoms just described. Thus, the practitioner will be occasionally puzzled by finding that there is merely coma without any convulsion; while the comatose condition will possibly be so slight that there is no difficulty in rousing the patient. The pupil may be natural, and neither dropsy, diarrhœa, nor vomiting shall have occurred. Nevertheless, there is either suppression of the functions of the kidneys; or if any urine can be obtained from the bladder it will be found highly albuminous, and proportionately deficient in urea.

The explanation of the ammoniacal state of the expired air, is simple according to the views of Dr. Richardson. It has been already mentioned, that in all persons there is an exhalation of ammonia by the breath; while in healthy urine there is also a very small quantity of this volatile alkali present. In uræmia, prior to coma or convulsions, the amount of ammonia in the breath is increased, for the lungs are supplementing the kidneys. But when the acute symptoms have been developed, the alkali may be absent from the respired air, owing to the unfortunate circumstance that the compensating eliminating function of the lungs has become suppressed.

Under treatment the acute symptoms sometimes pass off, and recovery to a greater or less extent ensues. Even in those very unpromising cases where there is structural disease of the kidney, the patients will now and then rally for some little time.

The *diagnosis* of uræmic toxæmia is not unattended with difficulty. Without care it is not unlikely to be confounded with those other diseases of which coma and convulsions are the prominent symptoms. Thus uræmia simulates epileptic coma, apoplexy, hysteria, cerebral anæmia, acholia, cholæmia, and alcoholic or narcotic poisoning. But the diagnosis may generally be correctly made by inquiring into the functions of the kid-

neys. For, in all cases of real coma or convulsions, we find either complete suppression of urine; or this excretion is scanty, of low specific gravity, deficient in urea, and highly albuminous. To distinguish suppression of urine from retention, it will possibly be necessary to use the catheter. Sometimes it happens that urea can be detected in the vomit, in the saliva, and in the sweat. When abundant in the latter, this salt has been found deposited on the skin in the form of a kind of scurf; which on a minute examination, has been seen to consist of urea and scales of epithelium.

Moreover, urea is present in the blood in considerable quantity; as can be proved by the following method of analysis: Take the serum procured after venesection or that which may be obtained from a good-sized blister, and add a few drops of acetic acid to it. Then evaporate to dryness over a water-bath; and extract the residue with boiling alcohol, which is a ready solvent of urea. This alcoholic extract is to be evaporated to dryness, treated with a few drops of distilled water, plunged into a freezing mixture, and then to have added to it a few drops of pure nitric acid. If urea be present, the characteristic crystals of nitrate of urea soon appear in the solution, and are positively recognized by the microscope.

From time to time it happens that a patient is not seen until he is comatose, and when (from the absence of friends) no account or previous history can be obtained. In a fatal case of epileptic coma which I saw some years ago under these circumstances, the symptoms so strongly resembled those due to uræmia, that no diagnosis could be made until the urine was drawn off and analyzed. The attendants upon the patient concluded that some narcotic poison had been taken; and as there were certain incidental matters of a suspicious nature it was deemed necessary to hold a coroner's inquest. Not that there was any failure in the medical evidence, but unpleasant rumors began to be circulated, and publicity seemed necessary to remove them.*

The *treatment* of a case of uræmia must be considered under two heads: 1. Where there is an excessive excretion of urea, there is greater tissue-waste than is desirable. It is probable that this may be checked by benzoic acid (F. 49); by citrate of iron and quinia (F. 380); as well as by digitalis, colchicum, acetate of potash, phosphate of soda, &c. Supposing that the occurrence of coma or convulsions is feared, the attempt should be made to purify the blood by means of those extensive excretory channels—the skin and intestinal canal. Sweating can be induced by the hot air bath, together with the copious administration of diluents, such as tea and iced lemonade and cold water, &c.; or by wrapping the patient in the wet sheet (F. 136); or by sponging the body with tepid vinegar—a proceeding which often produces copious diaphoresis. The best purgatives, perhaps, are saline aperients with colchicum (F. 141); or assafœtida and castor-oil enemata (F. 190); or elaterium, jalap, or podophyllin (F. 151, 157, 160). Where there is debility, small doses of steel had better be given (particularly F. 392, 403). And I feel sure that I have done much good in these cases by the prolonged exhibition of arsenic (F. 52, 399), though I am not prepared to state its mode of action. The practitioner must carefully avoid the use of calomel; for even one or two moderate doses may develop mercurial ptyalism in cases of renal disease. So also, opium is generally objectionable; although, on the principle of selecting the lesser of two evils, I have not hesitated to resort to it where there has been great irritability or sleeplessness. Blisters, nay even sinapisms, can be of no service, while they have caused gangrene of the skin. Stimulants, such as

* Medical Gazette. New Series, vol. xiii, p. 578. London, 1851.

wine and brandy and whisky, are capable of causing much mischief, though used in moderate doses. Nevertheless, they are not to be withheld if absolutely needed; for given with caution, and properly diluted, I have seen them do more good than harm. The diet should be plain; and while nourishing, ought not to contain much animal food.

2. As regards the management of those cases where the eclamptic fits have set in, I know of no remedy so efficacious as chloroform (F. 313). The inhalation of this agent, or of a mixture of chloroform and pure ether, may really be resorted to without fear; though doubtless it requires some courage to administer it, particularly where the practitioner has not previously seen its value, and where the patient is already insensible from the toxæmia. At the same time, an antispasmodic mixture of ether, assafœtida, &c., can be used as an enema. Purgatives may be employed if the bowels are loaded. If deemed advisable, sweating should be induced by one of the means already mentioned. And lastly, venesection has been advocated; on the principle that in proportion as the cerebral and renal congestions are relieved, consciousness will gradually be restored. Without denying that opening a vein may sometimes be useful where there is congestion of the brain, yet as I believe there is an opposite state during all convulsions, the practice cannot but be condemned. Moreover, it has happened to me to witness examples of puerperal convulsions attended with flooding; and in some of these it was certain, that the more freely the blood came away, the greater became the severity of the symptoms. Nevertheless, so far as I recollect, none of the cases on which this observation is founded, ended fatally; so that they may be made to tell both against and in favor of the abstraction of blood.

Finally, it appears certain that the formation and excretion of urea are much increased by a purely animal diet; and that the amount of this substance is greater under a rich or mixed, than under a spare or vegetable diet. Hence, when the kidneys act imperfectly, it may not be unadvisable to attempt to limit the production of urea (or of creatin, if we incline to the views of Oppler and Zalesky) as far as possible. This is to be effected by the employment of starchy and fatty foods, as arrowroot and tapioca, and sugar and cream, &c.; all nitrogenous matters being allowed in diminished quantity.

8. **ACHOLIA.**—The liver is the largest gland in the body; its weight, in the adult, varying from 2 to 4 lbs. During digestion it always becomes much congested; and consequently, while this function is in action, the organ is both larger and heavier than at other times. There are many reasons for believing that four different operations are conducted by the hepatic cells: (1.) The production of amyloid substance. (2.) The manufacture of bile. (3.) The final destruction of old blood-corpuscles, probably after their partial disintegration in the spleen. While (4) they probably aid in the perfecting of the young corpuscles or blood-cells.

Human bile is a complex fluid; being viscid, of a dark golden-brown tint, having a specific gravity of about 1018, and being neutral when perfectly fresh. The secretion of it is constantly going on; though this takes place most actively during digestion. The daily quantity of bile secreted in man is not positively determined; but if it bear any proportion to that in the carnivora we may estimate it, from the experiments of Bidder and Schmidt, at about 2½ lbs. for an adult weighing 140 lbs. The following, in addition to 88 per cent. of water, are the constituents of the bile: (1.) Bilin or biliary matter; a compound of soda combined with two resinous acids—the glycocholic and taurocholic, forming glycocholate and tauro-

cholate of soda. (2.) Cholesterin, a crystalline fatty matter not peculiar to bile. (3.) Biliverdin and bilifulvin, or coloring matter. (4.) A resinous or waxy material. (5.) Chloride of sodium. And (6.) inorganic matter—chiefly soda, potash, magnesia, and lime.

Until very recently, the physiologists of the present era have generally allowed (and the opinion is still maintained by many authorities) that none of the matters which constitute bile exist preformed in the blood; so that the constituents of this fluid have been supposed to arise not by a process of simple excretion, but by one of actual formation in the liver. The hepatic cells, it has been said, not only attract certain matters from the blood flowing through the capillary vessels, but they effect within their cavities a transmutation of these matters. Hence, disorganization of these cells—or, in other words, arrest of the functions of the liver—from any cause, must lead to acholia.

In order that the practitioner may become acquainted with the most recent opinions upon the formation of bile, attention will be fitly directed to some important researches on this matter. And, to begin, it must be confessed that our knowledge of the uses and pathological importance of *cholesterin* is not very precise. Dr. Austin Flint, Jr., of New York, however, has made some observations, which if confirmed would go far to clear up many of the unsettled points relating to this substance. He has particularly examined cholesterin in its relations with serolin; the latter being a substance hitherto detected only in the serum of the blood (whence its name), but which Dr. Flint has found to exist normally in the fæces, and which therefore he has named stercorin. It is held that these two substances—cholesterin and serolin or stercorin—have a direct relation to each other; and that the knowledge of this relation, and of the function of cholesterin, may explain those symptoms which attend the morbid condition termed acholia. For this latter term, Dr. Flint substitutes cholesteræmia. He believes that cholesterin is a product of the destructive assimilation of the nervous tissue, being absorbed from the substance of the brain and nerves by the blood, and eliminated by the liver. Hence in the bile there are two important elements having two separate functions: "1. It contains the glycocholate and taurocholate of soda; which are not found in the blood, are manufactured in the liver, are discharged mainly at a certain stage of the digestive process, are destined to assist in some of the nutritive processes, are not discharged from the body, and, in fine, are products of secretion. 2. It contains cholesterin; which is found in the blood, is merely separated from it by the liver and not manufactured in this organ, is not destined to assist in any of the nutritive processes, but merely separated to be discharged from the body, and is a product of excretion."* As cholesterin is not found as such in the fæces (notwithstanding the contrary statement by several authors on physiological chemistry), Dr. Flint has made many experiments to determine what changes it undergoes; and the result of his investigations is, that it is converted into stercorin (or serolin). The retention then of cholesterin in the blood produces toxæmia, just in the same way as we have uræmic poisoning from the accumulation of urea. The difference in the gravity of the symptoms in the two varieties of jaundice (that from retention and that from suppression) is due to this circumstance, viz., that in simple jaundice, dependent on the retention of the bile in the excretory passages, and the absorption of its coloring matter, the amount of cholesterin in the blood is not necessa-

* American Journal of the Medical Sciences. New Series, vol. xliv, p. 337. Philadelphia, 1862.

rily increased; while in jaundice connected with structural change cholesterin is retained, and acts as a poison.

Dr. Harley has likewise published* some valuable observations which tend to confirm the opinion that jaundice has a twofold origin,—from *reabsorption*, owing to some obstruction to the escape of bile, and from *suppression* with retention in the blood of the matters which should be formed into bile by the liver. But he also believes that the liver is an excretive as well as a formative organ of the bile. The liver manufactures glycocholic and taurocholic acids. But it only separates from the blood the biliverdin† or coloring matter of the bile, and the cholesterin, which substances are not peculiar to the liver, but are always found in the blood independently of the presence or absence of the liver. In jaundice from suppression, the substances which the liver generates will be entirely wanting, while those which it merely excretes from the blood will collect in this fluid. Consequently the biliverdin accumulates till the serum is saturated with this pigment, from which it exudes and stains the tissues, producing the color we term jaundice. The elimination of this matter by the kidneys renders the urine of a saffron hue. Hence, Dr. Harley regards these symptoms as due to the imperfect excretion of biliverdin, quite independent of the presence or absence of the other constituents of the bile. The bile acids, not the bile pigment, induce the symptoms of poisoning. And from this it is argued, that when the coloring matter alone is found in the urine, the jaundice is due to suppression; but when the biliary acids are present, it is clear that they must have been formed by the liver, and owing to some obstruction have been reabsorbed into the blood.

According to Dr. Lionel Beale, the view that in certain cases of jaundice there is suppressed action of the liver, that bile is not produced, and that no biliary acids are formed, is opposed to many facts. Entertaining the opinion that the coloring matters as well as the resinous acids are actually formed in the liver, he also thinks that in all cases of jaundice the bile has been formed by the hepatic cells; this fluid having been reabsorbed after its formation, and perhaps much of it again excreted in an altered form by the intestines. "It is easy to conceive," says Dr. Beale, "that the relative proportion of the biliary acids and coloring matters produced, may be very different in different cases—that the quantity of the acids formed may vary greatly—that their composition may be affected, taurocholic acid being produced instead of glycocholic acid (Kühne)—that the quantity of blood-corpuscles disintegrated by the presence of bile compounds in the blood varies—and that other chemical derangements may be caused, although the action of the liver *cells* is not suspended even for a very short time."‡

There are certain diseases of the liver—such as acute atrophy, imper-

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* Jaundice: its Pathology and Treatment. London, 1863.

† There seems to be a repugnance on the part of chemists, in the present day, to work upon any subject without coining one or more new names. This extravagance only leads to confusion: for unfortunately, though two authorities write upon the same matter, at the same time, they will not adopt the same nomenclature. They only agree in discarding the terms which have been previously received. It is difficult to say by how many different denominations the bile-pigment is known. Dr. Thudichum (A Treatise on Gallstones, p. 90, London, 1863) employs the word *cholochrome* to designate coloring matter of bile and all its varieties. For the brown coloring matter he retains the name *cholophœine*, for the green variety *cholochloine*. The older names of cholepyrrhin, biliphœin, and bilifulvin may be regarded as synonymous with cholophœine. Biliverdin and cholechlorine seem to be the synonyms of cholochloine.

‡ Kidney Diseases, Urinary Deposits, and Calculous Disorders. Third edition, p. 237. London, 1869.

meability of the bile-ducts, cirrhosis, fatty degeneration, &c.—which lead to complete disorganization of this gland, and therefore to an arrest of its functions. Under these circumstances symptoms of blood-poisoning will arise, which very generally terminate fatally in a short time. Of course this toxæmia does not ensue in all cases, because sufficient healthy hepatic tissue may be left to do the necessary work.

Abnormal conditions of the nervous system are the essential *symptoms* in cases of acholia. Usually there is, first, a stage of excitement, characterized by noisy delirium and convulsions; followed, secondly, by depression marked by somnolence and progressively increasing coma. Sometimes the first stage is absent, and the patients rapidly fall into a state of typhoid prostration, which passes into coma. Along with these symptoms we have hemorrhage from the mucous membrane of the stomach and intestines, petechiæ with ecchymoses of the skin, and in a few cases, jaundice.

The *treatment* must consist in the administration of active purgatives, particularly croton oil or podophyllin (F. 160, 168). Benzoic acid (F. 49), or the chloride of ammonium (F. 60), or the diluted nitro-hydrochloric acid (F. 378), can be tried, if there should be time for either of them to act. By these agents life will perhaps be prolonged for a brief period. Beyond this the cases are hopeless.

The term acholia [from Ἀ = privative + χολή = bile], signifying deficiency or absence of bile, has been here employed in the sense intended by Frerichs. Without, therefore, saying that this author's views are correct, we may, with our present imperfect knowledge, assume them to be so. Hence acholia must not be confounded with jaundice or cholæmia [from Χολή + αἷμα = blood], a morbid state in which bile exists in the blood owing to its reabsorption after having been formed by the liver. In the one case we have retained in the blood those substances by the metamorphosis of which bile is produced; in the other, the blood contains the bile itself. The subject of jaundice has to be still further considered in the section on hepatic diseases.

9. PYÆMIA.—A very important morbid condition of the system, known frequently as ichorhæmia, or septicæmia, or pyæmia [*ichorhæmia*, from Ἰχώρ = sanies, or any thin acrid matter discharged from wounds + αἷμα = blood; *septicæmia*, from Σήπω = to putrefy; *pyæmia*, or *pyohæmia*, from Πύων = pus]; is caused by the introduction of ichorous or putrid matters into the blood. The disease is generally known as pyæmia, or purulent absorption; terms which are objectionable, inasmuch as they incorrectly lead to the inference that pus is present in the circulating fluid. Ichorhæmia is never a primary affection, but occurs subsequently to some injury or wound which takes on an unhealthy action. It may follow a boil or carbuncle, a diffused abscess, an attack of erysipelas, a burn, a compound fracture, a dissecting wound, a surgical operation, or the act of parturition—especially if any portion of placenta be left in the uterus to undergo decomposition. Suppurative inflammations of the joints, as well as acute inflammations and necroses of the shafts of the bones, especially seem to induce it. But however brought about, ichorhæmia sets up a series of very grave symptoms, and often ends fatally. The constitutional disturbance is so severe, that it sometimes seems at once to deprive the sufferer of all power of rallying; while if he escape with life at the onset, he is not unlikely afterwards to succumb from the suppuration and other changes which occur in structures distant from the primary disease. The chief of these changes consist of—extravasations of blood, especially in the lungs, the muscular substance of the heart, the spleen, the brain, and the areolar or connective

tissue generally; inflammatory consolidations of pulmonary, hepatic, and other structures; and diffused or circumscribed, solitary or multiple, collections of pus. These collections are most frequently met with in the liver, lungs, spleen, kidneys, brain, joints, &c. In puerperal cases more especially, the eye is liable to suppurative inflammation, which ends in sloughing of the coats and extrusion of the humors.

On reviewing the *pathology* of ichorhæmia, the first question which requires an answer is this: Do the symptoms depend upon the presence of pus-cells in the blood? The attempt to solve this difficulty has given rise to a vast amount of controversy. Until recently the question was always answered in the affirmative; and consequently the name of pyæmia became current. To explain how the pus-cells passed into the blood and infected it, three hypotheses were regarded with more or less favor. Thus it used to be said: (1.) The pus-globules are absorbed (purulent absorption) from a suppurating cavity. (2.) The pus is the result of inflammation of the walls of the veins (phlebitis); this action leading to the production of pus in the venous channel, whence it is carried onwards into the general circulation. (3.) The pus is furnished by a suppuration of the blood itself. How little dependence is to be placed on either of these theories will now be shown.

For the detection of pus in the blood, the microscope has been almost exclusively depended on. But since the publication of Dr. Hughes Bennett's Researches on Leucocythæmia (in 1852) it has been generally allowed that the so-called pus-corpuscles which have been detected in the blood are identical with the colorless cells of that fluid; these bodies constituting, when in excess, the white cell blood. Moreover, most pathologists agree that there is nothing peculiar in good and laudable pus which necessarily leads it to poison the blood. The absorption of pus in its entirety is not possible; but there can be no doubt that the fluid portion of pus may be entirely absorbed, leaving behind merely the shrivelled cells deprived of their vitality. This inspissation of pus occurs without producing any symptoms of the so-called purulent infection, unless indeed the fluid part be putrid. Again, there is a second way in which the whole contents of an abscess can disappear, viz., by the pus-cells undergoing fatty degeneration, becoming disintegrated, and reduced to a fluid condition, in which absorption is rendered easy. There is, of course, the possibility of an abscess bursting into a vein; but in all probability, before this took place the canal of the vessel would be obliterated. And so, likewise, the peripheral lymphatic vessels may in the same manner become filled with pus; but before they reach a bloodvessel their course is interrupted by lymphatic glands, in which they break up into small branches, and through these no pus-corpuscle could pass. Virchow well illustrates this occurrence by showing that in the process of tattooing, some of the cinnabar or gunpowder or the like finds its way into the lymphatic vessels, but is always separated by filtration in the nearest lymphatic glands. Hence, while leucocythæmia proves that corpuscles identical in form and size and structure and chemical composition with those of pus, may float in the blood and circulate innocuously, so the fact of the absorption of abscesses, either wholly or in part, demonstrates that healthy pus is not poisonous. The truth, in short, seems to be, that what has been called pyæmia is not dependent upon pus-cells mingling with the blood; but on contamination of the latter by some animal poison, or by any putrid or decomposing matter. It is also certain that some decomposing fluids are more injurious than others, and hence the symptoms are of variable intensity.

Phlebitis and thrombosis have been regarded by many pathologists as

sources of ichorhæmia, but it is rather doubtful if there be any connection between these conditions so far as cause and effect are concerned. A more reasonable view seems to be, that while the introduction of ichorous matter into the blood gives rise to a general poisoning of the system, so it may likewise produce a local inflammation in the coats of the veins, together with the formation of one or more clots. It is not improbable, that among the first effects of phlebitis is an obstruction to the flow of blood through the vessel; this being produced either by the swelling of the coats of the vein, or by the formation of a clot. But even if disintegration of this clot should afterwards occur, it is doubtful whether this process can lead by itself to any toxic effects. Severe mischief will arise mechanically, but there need be no blood-poisoning.

The *symptoms* of acute ichorhæmia are well marked from the onset. The disease generally sets in with a severe rigor, followed by great heat of body, copious sweating, and increased frequency of pulse. The rise in temperature is remarkable; the thermometer in the axilla sometimes recording 104 or 105° Fahr. at the end of the first day. The rigors are occasionally repeated, perhaps periodically, or in their place various convulsive affections are substituted. In a lady who was long under my care with pelvic abscess, the re-formation of matter was sometimes preceded by a rigor and sometimes by an epileptiform seizure, but there was always one or the other to warn me of the mischief that had commenced. Then, if there is an open wound, it generally takes on an unhealthy appearance, the surface quickly becomes pale and glassy; or, instead of being bathed with laudable pus, its granulating surface looks indolent and the discharge from it ceases. Another symptom is a peculiar sweetish or fermentative odor of the breath and of the body generally. The aspect of the patient is peculiar, somewhat like that seen in typhus. At the same time there is great prostration of both mind and body, together with extreme restlessness, sickness, and frequent attacks of retching, diarrhœa with very offensive stools, dyspnœa, and hiccup and cough, pains about the region of the heart, and perhaps low muttering delirium. The urine is scanty, high-colored, and in exceptional cases albuminous: the chlorides have been found greatly diminished. The features become haggard, the face being alternately flushed and pallid. The pulse rises in frequency to 140 or upwards, while it is also small and quick. Auscultation will perhaps detect the signs of bronchitis or pneumonia, or a cardiac friction-sound and murmur may reveal the existence of pericarditis with endocarditis. The body wastes, the feebleness becomes extreme, the lips and tongue get brown and dry and covered with sordes, and the conjunctivæ and skin assume a sallow or even decided jaundiced hue. Not uncommonly, a sparse pustular eruption is observed on the chest or abdomen, or there will be spots or lines of congestion about the skin of the limbs or trunk, or small erysipelatous patches come out. Various parts of the body become excessively tender, while the suffering from diffuse suppuration in the tissues or joints may prove most severe. There is often subsultus tendinum. Profuse sweats, with perhaps effusion into the pleuræ or pericardium, or a low form of pneumonia or of hepatitis, increase the exhaustion, so that the patient dies worn out. When, on the other hand, the case terminates favorably, the fortunate escape has to be paid for by a wearying and tedious convalescence.

It follows from the foregoing, that there can scarcely be any mistake in the *diagnosis* except at the commencement of the disease. Then it has sometimes been difficult to say exactly what the symptoms have been due to. Most frequently, perhaps, when an error has been committed, the disturbance has been attributed to rheumatic fever, erysipelas, typhus,

typhoid fever, scarlet fever, pneumonia, inflammation of the urinary organs, &c. The uncertainty can, however, generally be removed by remembering that ichorhæmia occurs in connection with some wound, or injury, or attack of erysipelatous or other inflammation; while the symptoms are more acute and increase more rapidly, and sooner give rise to alarming prostration than happens in the case of acute rheumatism or of any continued fever.

The *prognosis* in all forms of ichorhæmia is unfavorable; but it is especially so when the patient has been previously lowered by exhausting disease, by hemorrhage, by a severe operation, or by insufficient food with residence in an unhealthy house. Taking all cases into consideration, it is probable that 75 per cent. prove fatal. The mortality from this form of blood-poisoning amongst the wounded in the late American war was enormous. It formed one of the chief sources of death after amputation; "and its victims are to be counted by thousands." There are said to be several valuable reports on this subject in the Surgeon-General's office at Washington, which will doubtless be published by and by.

The rate at which the symptoms may run on to a fatal termination varies, death frequently occurring within the week; though with alternate remissions and relapses, it will possibly be deferred for some three months or more. If we were to tabulate the reports of a large number of fatal cases of ichorhæmia it would, in all probability, appear that 40 per cent. had died by the end of the seventh day from the commencement of the attack, 60 per cent. by the end of the fortnight, 75 per cent. by the end of the fourth week, 90 per cent. by the close of the second month, 95 per cent. by the termination of the third month, leaving five to struggle on for a longer but indeterminate period.*

In contrast to the acute form there is a class of cases where the disease runs an essentially chronic course. The symptoms are of the same nature as are observed in acute ichorhæmia, save that they are much milder in character and are spread over a longer space of time. Moreover, there are sometimes intervals of apparent recovery, followed by relapses; each relapse, however, lessening in severity and peril. In this way, the disease has been known to extend over several months—possibly to last for a couple of years. The chief danger to be dreaded is that disease of the lungs will get developed. The risk of this is very greatly increased if there be a constitutional syphilitic taint in the system, or if there be any hereditary tendency to tuberculosis.

Ichorhæmia is particularly dreaded by obstetricians and surgeons, since it not unfrequently is the cause of highly dangerous symptoms after partu-

* As a good example of the rapidity with which the symptoms will run on in an acute case, attention may be directed to the following instances recorded by Dr. William Addison: On the 28th December, at 8 o'clock A.M, a physician pricked his finger while assisting to make the post-mortem examination of a lady who had died from puerperal peritonitis. In the evening he felt some pain and uneasiness at the part, and had it touched with nitrate of silver. During the night shiverings came on, and there was extreme restlessness. On the morning of the 29th the finger was much swollen, and red lines extended up the arm; leeches, fomentations, and poultices were applied. In the afternoon there was great prostration On the 30th the hand and arm were greatly swollen, the finger had put on a livid appearance, the glands in the axilla were affected, and the pain was very great. On the 31st the pulse was from 90 to 100, the breathing was irregular, and there was torpor with drowsiness. In the evening the symptoms were found more alarming, and there was an erysipelatous blush over the side of the chest and in the axilla. During the night the breathing became more difficult, the drowsiness gradually passed into deep stupor, and death took place at six o'clock on the morning of the 1st January.—Cell Therapeutics, p. 86. London, 1856.

rition (puerperal fever) and surgical operations. It may display itself in more ways than one. Thus, in some instances, the blood seems to be so immediately and deeply affected by the morbid matter, that the patient's death occurs before any local phenomena can be developed. In a second class, the intensity of the poison appears to be exerted upon the liver or the mucous membrane of the intestinal canal; in the one case there arising spontaneous efforts at elimination by the discharge of a large quantity of dark bile, in the other through a severe attack of diarrhœa or dysentery. Then there is a third set of cases where the serous membranes bear the brunt of the poison, and we have pleurisy, or pericarditis, or peritonitis; or the cutaneous surface is the part affected, and we find erysipelas, or a more or less copious eruption of boils. And again, there is a fourth class in which profuse suppuration ensues, giving rise to secondary abscesses in the lungs, liver, joints, eyes, &c.

Amongst the various forms of blood-poisoning is one to which the term *Cellulitis venenata* was formerly applied; meaning thereby a diffused form of inflammation of the connective tissue, arising from one or more punctures received in dissecting the dead body. Certain animal fluids are more dangerous than others, as the serum found in the abdomen after peritonitis, and that left after gangrenous inflammation. The bites of several venomous reptiles, as the cobra di capello, will also produce the same effects; and even the sting of the bee has proved fatal. The poison, whatever its nature, when thus absorbed gives rise to very severe constitutional disturbance; which, as in puerperal fever and erysipelas and the eruptive fevers, &c., may end fatally before sufficient time has elapsed for any appreciable local lesions to become produced. Where this does not happen, however, there sets in more or less severe inflammation of the connective tissue and absorbents, generally of the wounded limb, but sometimes of remote parts. The lymphatic glands are very often affected. The skin over the seat of inoculation and surrounding parts, becomes pale but tense and shining; while the swelling which occurs communicates a peculiar boggy feel to the touch. These inflammations are attended with rigors, restlessness, extreme pain, and great depression; while they either cause death in a few days, or they end in suppuration or gangrene. In fatal cases, death is preceded by delirium, offensive perspirations, a yellowness of the skin, dyspnœa, drowsiness, and deep stupor. When patients recover, it is often only to find the constitution permanently injured; or, at least, with the general powers of life so impaired that years elapse before perfect health is regained.

The effluvia given off from the dead body may be the cause of extensive toxæmia or blood-poisoning. These effluvia can, without injuring the party exposed to them, be carried by him to a third person placed under such circumstances as invite disease, and so provoke the most distressing results; a fact which demands the particular attention of obstetricians.* At the Lying-in hospitals of Vienna and Prague, a very large mortality was dis-

* This statement as to the pernicious influence of these poisons is well illustrated by a case which occurred in the practice of Mr. Teale. This surgeon says: "One evening, at the dissection of the body of a patient upon whom I had operated for strangulated hernia, several surgeons were present. Of these, two attended one case of midwifery each during the following night, and a third three cases. The two patients attended by the first two surgeons died of puerperal fever. Two of those attended by the third surgeon also died; and his third patient escaped death from this formidable malady with the greatest difficulty, after having been in extreme danger several days. It is an important fact, that no other cases occurred in the practice of these gentlemen."—A Treatise on Abdominal Hernia, p. 92. London, 1846.

tinctly traced to a want of caution in admitting students from the dissecting-rooms to the wards. The surgeon also, who goes heedlessly from a case of erysipelas or any variety of unhealthy inflammation to the lying-in room, may set up most formidable mischief in the tenant of the apartment. The danger which arises from handling morbid preparations, unhealthy purulent secretions, &c., is equally great; and consequently the obstetric practitioner cannot exercise too much caution. If obliged to be present at any case of blood-poisoning or at a post-mortem examination, he should not visit any parturient woman until he has changed all his clothes, and has washed his hands thoroughly with some chlorine solution or other active disinfectant.

The *treatment* of ichorhæmia has to be conducted with considerable caution. Heroic remedies are out of the question. The painstaking and judicious practitioner may perhaps succeed in restoring his patient to health; but no brilliant cures are to be expected. For it must be remembered that this exhausting affection is most common during unhealthy seasons, when disorders of a low type are prevalent. Moreover, the sufferers from it are usually those whose constitutional powers are not of the first order. Hence, while endeavoring slowly to carry out the object of primary importance, the purification of the blood, we must not fail to support the excessively depressed vital powers and to relieve pain.

Taking the latter indications first, it will suffice to say that stimulants are needed from the commencement; wine or beer appearing preferable in some instances, while in others brandy or gin or whisky have to be given. In regulating the doses, and the intervals between them, there is scope for much judgment. It is impossible to lay down any precise rules here. I would, however, strongly insist upon the importance of ordering these remedies—so powerful for good or evil, as they are rightly or wrongly employed—in definite quantities. All stimulants should be prescribed as drugs are ordered; the exact dose, as well as the time for its administration, being distinctly stated at every visit. Amongst other resuscitating agents the restorative soup (F. 2) will often be invaluable; and so will the essence of beef (F. 3), or a mixture of brandy and eggs (F. 17). Milk is of the greatest service, and should be given as freely as it can be digested. Sometimes it happens that cream agrees better than milk. Bark, with ether or ammonia (F. 371), is a good remedy; while in some instances life would seem to have been preserved by the administration of three or four grains of quinine every four or six hours, until the head has become slightly affected. Pain is to be relieved by opium, in doses sufficient to soothe and comfort the patient. Troublesome sickness can sometimes be controlled by the dilute hydrocyanic acid (F. 86, 362), by laurel water with citrate of soda (F. 348), by the citrate of potash in soda water (grs. 10 to 40, every three hours), by some preparation of bismuth (F. 65, 112), or by oxalate of cerium; as well as by the application of linseed poultices, or sinapisms, or flying blisters to the epigastrium. To check the thirst, iced drinks and cherry water ices are serviceable. Wenham Lake ice to suck can be allowed very freely. Draughts of equal parts of iced soda water and milk, or of Seltzer water and champagne, are not only very refreshing, but will frequently be retained when the stomach rejects other drinks. And then, in all cases, care must be taken that the patient's bed is placed in the centre of the apartment, that the hangings are removed, that a sufficient fire be maintained, and that the windows be opened. He must be kept in a pure cool atmosphere, night and day, even at the slight risk of catching cold. In truth, however, this risk is merely a phantom. Miss Florence Nightingale tells us that in the wooden huts before Sebastopol, with their pervious walls and open ridge ventilators, in which the sick and

wounded soldiers sometimes said "they would get less snow if they were outside," such a thing as *catching cold* was never heard of. The patients being well covered with blankets, were all the better for the cold air.*

To prevent the occurrence of ichorhæmia and erysipelas in our hospitals, the latter should be built in healthy localities; plenty of light must be admitted into the wards; while 2500 cubic feet of space per bed ought to be allowed, with an interval of about 6 feet between each couch. A good nurse—one who will quietly but thoroughly carry out the physician's directions—is invaluable. She will of course attend to the perfect cleanliness of the sufferer and his bedding and his room. To learn the cubical contents of a room, multiply its length by the breadth and height. The product divided by the number of beds, will give the amount for each bed.

To eliminate the poison from the system practitioners have very commonly trusted to active purgatives, particularly to full doses of calomel. Even if there were no other remedies deserving of trial, I should still discountenance the routine use of these agents; for I believe their mischievous effects to be second only to those produced by bleeding. At the same time, if at the commencement of the case there are indications that the intestines are loaded, an aperient should be given—not a drastic purge. For it has been shown previously, that foremost amongst the symptoms of ichorhæmia are sweating and vomiting and purging. Now if we allow, as may fairly be done, that these evacuations are critical or eliminative, yet it will be very wrong to push this view to the illogical conclusion that more sweating and more intestinal action are to be encouraged. Without a doubt, if the skin be inactive it will be frequently beneficial to induce perspiration. With this object we may employ the vapor bath, or the wet-sheet packing (F. 136), or even the acid sponging (F. 138); at the same time administering diluents freely by the mouth.

After an elaborate series of experiments, Dr. Polli, of Milan, has come to the conclusion that sulphurous acid, and various sulphites and hyposulphites, have the power of arresting all known forms of fermentation, as well as of retarding putrefaction.† Many diseases (typhus, pyæmia, puerperal fever, hospital gangrene, dissecting wounds, glanders, cholera, &c.), he asserts, arise from a fermentation of some of the principles contained in the blood; and one grand object of his memoir is to prove the fallacy of Bernard's view,—that the use of chemical agents capable of arresting the fermentation would destroy the vital properties of the blood. Dr. Polli's experiments were of this nature: A certain number of dogs had putrid blood injected into their veins, and all died but one. An equal number had large and repeated doses of the sulphites administered; and subsequently the same quantity of putrid blood was injected, as in the first cases. All recovered. Then it was also found, that if the putrid blood were mixed with a certain proportion of sulphite of soda before injecting it, the dogs did not die as when putrid blood alone was employed. And again, an equal quantity of the discharge of glanders was injected into the femoral veins of two large dogs. One died, with the symptoms of glanders, in six days; the other, previously sulphited, quickly recovered. As to the mode of administration of the sulphites

* Notes on Hospitals. Third Edition, p. 15. London, 1863.

† Sulle Malattie da Fermento Morbifico, e sul loro Trattamento. Milan, 1860. See also, British Medical Journal, p. 339, 29 March, 1862, and p. 441, 16 November, 1867: Half-Yearly Abstract of Medical Sciences, vol. xxxvii, p. 245. London, 1863; and Mr. Henry Lee's Introductory Lecture at St. George's Hospital, On General Principles in Medicine, p. 20. London, 1863.

in man, Dr. Polli tells us that they may be fearlessly given in large doses. From 60 to 180 grains of the sulphite or hyposulphite of soda or magnesia can be given daily, in divided doses, for several days together. As the sulphite of magnesia (F. 48) is the richest in sulphurous acid, it is preferable to every other preparation. About twenty parts of water are needed for its solution.

Since becoming acquainted with Dr. Polli's views, I have had numerous opportunities of testing the efficacy of sulphurous acid and its combinations in various forms of blood-poisoning. And succinctly stated the result has appeared to me to be this,—that while on the one hand these agents certainly have done no harm, yet on the other side I find it difficult to persuade myself that they have proved of any service. On the whole, sulphurous acid with quinine has seemed to do more good than the acid alone. I have also tried various alkaline salts, such as the bicarbonate of potash, &c., but cannot bring forward the slightest evidence of their possessing valuable properties. And the same confession must be made with regard to the permanganate of potash; which, however beneficial as an antiseptic when applied externally, seems to have no value as an internal remedy in diseases like those under consideration.

As regards the local treatment of any ulceration or injury which may be present, it is necessary to insist upon the primary importance of cleanliness. Foul external wounds cannot be better managed than by the use of irrigation, so as to constantly remove all the unhealthy secretions. Continuous immersion of the part in tepid water is sometimes practicable and highly serviceable. If there be unhealthy discharges from internal organs—*e. g.*, the ear, the nostrils, the uterus—injections of warm water containing some antiseptic like the permanganate of potash ought to be employed several times in the twenty-four hours. Where abscesses have formed and are pointing it will be better to open them. If there be a reasonable fear that suppuration has occurred among the deeper tissues—beneath the fasciæ, free incision will be called for.

The remedies for chronic ichorhæmia are of the same description as the foregoing. Simply enumerated, they may be said essentially to consist of restoratives, nourishing food, pure air, tonics, and the removal of all sources of irritation from the system. Finally, in wounds from dissecting, or from the bites of reptiles, attempts are to be made by sucking or by the application of a cupping-glass to remove the poison from the puncture or bite. To prevent absorption, a ligature is at the same time to be tied between the wounded part and the trunk. It will also be advisable to apply lunar caustic freely to the wound. In other respects the treatment must be that just mentioned.

10. THROMBOSIS: EMBOLISM.—The fact has long since been proved by many independent observers, that when the blood contains—either absolutely or relatively—a great excess of fibrin (hyperinosis), or when this fluid gets contaminated by the introduction of foreign particles or other impurities, as well as when there exists any obstacle to the normal circulation, then fibrinous formations may take place during life in the heart, or in the arteries, or in the veins, or in the cerebral sinuses, or in the portal system. The symptoms which these solid substances (formerly known as polypi) give rise to are such, that their existence can with care be diagnosed. When a portion of fibrin coagulates in one of the arteries and is carried along by the blood-current, it will of course be arrested in the capillaries, if not before; when the solidification occurs in the veins, it need not necessarily be stopped till it reaches the lungs: when in

the portal system, the liver capillaries will offer an obstacle to the further progress of the substance. And although it should be noticed that emboli may form in the lymphatics, yet the passage of these vessels through glands must prevent the transit of any body for any great distance along them.

Pathology.—Before entering upon this part of the subject, it is necessary to give an explanation of the terms employed. By *thrombosis* [*θρόμβος* = a clot of blood] is generally understood the partial or complete closure of a vessel, by a morbid product developed at the site of the obstruction. The coagulum, which is usually fibrinous, is known as an *autochthonous clot* or *thrombus*. The term *embolism* [*Ἔμβολος* = a plug] is used to designate an obstruction caused by any body detached and transported from the interior of the heart or of some vessel. The migratory substance is an *embolus*.

Thrombi or emboli vary in size—from a mass sufficient to obstruct the aorta, to a particle which can enter a capillary vessel. They consist not only of fibrin, but possibly of a fragment of gangrenous tissue, or perchance of a portion of tubercle or cancer which has got drawn into a vessel. The formation of a thrombus in a bloodvessel may act primarily by causing complete or partial obstruction. The secondary disturbances are twofold: in the first place, larger or smaller fragments become detached from the end of the thrombus, and are carried along by the current of blood to remote vessels (embolism); or, secondly, the coagulum softens and becomes converted into a matter like pus,—constituting according to Virchow the process called "suppurative phlebitis."

These concretions are most frequently met with in diseases attended with great exhaustion or debility; and they have been especially found in cases of croup, diphtheria, scarlet fever, endocarditis, pneumonia, bronchitis, phthisis, typhus, purpura, erysipelas, hemorrhage, and prostration from natural decay as well as from dissipation. With regard to croup, for example, my own experience would lead me to believe that death is much more frequently due to thrombi than to simple asphyxia. The formation of these substances seems also to be particularly favored by the condition of the blood during pregnancy and the puerperal state. Thus in August, 1863, I saw a lady whose general health was never good, who had advanced to the sixth month of her second pregnancy, and in whom the following series of events had occurred: A sudden fright, apparently acting as the cause; succeeded by an attack of fainting, great rapidity of heart's action, agitation with nervous depression, and very severe pain in the left leg and ankle. When I visited her on the day following the occurrence of these symptoms there was much debility; while the foot and leg were very œdematous and cold, and no pulsations could be detected beyond the femoral artery. The symptoms, in short, were just those which would arise from the application of a ligature to the chief artery of the limb; and there was clearly the same necessity for establishing a collateral circulation to avoid gangrene. Of another variety of these cases I met with an example in 1860: A delicate lady, twenty-five years of age, under my care, had such symptoms after the delivery of her first child, that I believe a small clot formed in the right side of the heart, though her labor had neither been difficult nor attended with more than ordinary hemorrhage. For six weeks after her accouchement, the muscular prostration was so extreme that she literally could not turn over from one side to the other; and when the least attempt was made to raise her in bed, so as to change her linen, &c., the most severe attacks of dyspnœa set in.

The fibrinous masses either form suddenly, without the least warning, and at once caused death by obstructing the circulation; or else they arise

gradually, and produce symptoms which creep on insidiously and last a long time. In the latter case, the masses (thrombi) become organized and attached to the walls of the heart, or they may soften and gradually deliquesce; while from these attachments, portions (emboli) can be carried away by the blood so as to block up the circulation at some extreme point. Perhaps the right auricle is the most common seat of these clots; but it can easily be understood that the edges of the valves, as well as the muscular and tendinous cords of the ventricles, are parts to which they readily become attached. Possibly, also, the small beadlike and warty exudations thrown out in endocarditis will sometimes form a foundation on which a concretion becomes deposited. The particles of solid fibrin carried away by the blood from the left side of the heart are usually arrested in the vessels of the brain, spleen, or kidney; while those from the right cavities pass by the pulmonary artery and its branches into the lungs.

Symptoms.—The indications presented when a coagulum has formed in the *heart* are always well-marked. They are likewise of the same general character, whatever may be the disease from which the patient is suffering at the time of its formation. Their nature varies according as the concretion is deposited on the right or on the left side of the heart. When the obstruction is on the *right* side, as is most commonly the case, the return of blood from the systemic veins is prevented; and as the flow of blood to the lungs for aeration is impeded, so arterial blood is not duly supplied to the brain and heart and other organs. Hence where death results, it happens from syncope rather than from asphyxia; though if the clot be of such a size that no blood can enter the pulmonary artery, then death necessarily happens immediately from suffocation.

The course of the symptoms can perhaps be best shown by referring to the case to which allusion has already been made. This patient had a favorable labor of some eight hours' duration; and when left by me at midnight, about an hour and a half after the birth of her child, was in a favorable condition. The pains of parturition had been very severe; but although the use of chloroform was suggested, the inhalation of it had been declined. Prior to my departure and afterwards, brandy with arrowroot was given; and at about two A.M. the lady expresed herself as feeling comfortable, and quietly fell asleep. She passed a good night; but on the following morning, at eight A.M., I was hastily summoned, as a most severe and distressing attack of dyspnœa had just set in. On my speedy arrival, the breathing was found to be hurried and gasping, the surface of the body pale and cold, the pulse frequent and small, and intermittent, and the patient exceedingly faint as well as frightened. Indeed, the state of collapse was very alarming; but the administration of some brandy with ether and ammonia, and the application of a large linseed poultice with mustard in it, gave sensible relief in about three-quarters of an hour. I could only venture to place the stethoscope over the apex of each lung, but I thus learned that the respiratory murmur was natural; and hence this fact combined with the tumultuous action of the heart, seemed to point out the latter as the seat of obstruction. The most perfect quiet was enjoined; the urine was withdrawn by a catheter; and small quantities of essence of beef, ammonia, and brandy were given at short intervals. At the end of the day, the extract of belladonna was freely applied over the breasts; so as to check, or possibly to prevent, the secretion of milk.

Now the foregoing symptoms were quite sufficient to teach me, even if the fact had not previously been learned from the writings of others, that cases of this description must generally terminate quickly in death. Certainly in this instance it was clear, that very little more was required for

the obstructed heart to become quite paralyzed. We know that patients prostrated by acute diseases, and also parturient women, have died suddenly after an attempt to sit up in bed or to pass a stool, and the fatal event has been referred simply to fainting; but it seems very probable that the real cause may have often been the sudden blocking up of one of the cardiac orifices, or of the pulmonary artery, by a mass of fibrin.*

When the clot obstructs the circulation by its situation in the *left* cavities of the heart, or in the aorta, death, if it occur, either takes place suddenly from syncope because no blood can circulate; or it may be delayed for some hours and happen from coma. The symptoms then are violent action of the heart, great congestion of the lungs with dyspnœa of a suffocative character, expectoration of a bloody and frothy mucus, a leaden hue of the surface, with coldness of the extremities. Supposing the patient to recover from the first urgent stage, the symptoms will gradually merge into those of valvular obstruction of the left side. Such a condition might be diagnosed by the sudden appearance of a murmur where the heart had previously been healthy, and where there had existed no signs of endocarditis. It must be remembered, that concretions have more than once been found to exist on both sides of the heart at the same time; and the symptoms have then chiefly resembled those which arise from deposition in the right cavities.

Suppose fibrinous concretions are discovered in any of the *arteries* or *veins*, it must be granted that possibly they have formed at the parts where they are found. For example, Dr. Humphry records, amongst other cases, that of a pale and anæmic and very weak girl, who was being dressed by her friends in order that she might be taken out of the hospital. Suddenly she fell fainting, and quickly died. During her stay in the ward the right arm had been swollen, and had been kept hanging out of bed, as the patient found this position, with the head inclined towards the right shoulder, the most comfortable. On examining the body there was slight emphysema of the lung, but otherwise the organs were healthy. The right innominate, subclavian, and internal jugular veins were each obstructed by a large clot. That in the innominate vein was firm, of a buff color, scarcely tinged with red, and adherent to the vessel's coats; in the jugular vein the clot was soft, and looked like a mixture of blood and pus.

But it must also be remembered, as before stated, that the concretions which form in the heart can be carried by the blood, wholly or in part, into some artery which they block up; and thus the supply of blood to an important organ may be suddenly cut off, producing alarming and even fatal results. Where the particles are minute they will perhaps be borne onwards into the capillaries, so as merely to give rise to local congestion and stagnation. Supposing that the masses soften and break up, there is no reason why the disintegrated portions by mingling with the blood should necessarily contaminate it. The injurious effects which result from the solidification of fibrin within the body are of a mechanical nature. At all events, it is difficult to imagine why coagulated fibrin should possess any poisonous properties, as has been taught.

The effects which have been found to ensue from a fibrinous deposit being carried from the *left* side of the heart, are as follows: In several instances, softening of the brain, ending in hemiplegia, owing to the plugging of the middle cerebral artery; paralysis and loss of sensation in the

* Further on, in the section on hydatid tumors of the liver (part viii), the history of a case will be found which distinctly illustrates the correctness of this suggestion.

arm, from the obstruction of the brachial and ulnar arteries; temporary loss of power in one of the lower extremities, which has become relieved on the solution of the clot, or on the establishment of the collateral circulation; disease of the kidney, the issue of obstruction of the renal artery; and disease of the spleen. The consequences which follow from the propulsion of masses of fibrin from the *right* side of the heart are shown in the lungs, by the presence of coagula in the pulmonary arteries and different kinds of deposit in the pulmonary tissue. Upon this principle can be explained the occurrence of some forms of pneumonia, gangrene of the lung, &c. Obstruction in the pulmonary capillaries is indicated by œdema or infiltration of the lung-tissue, and by pulmonary apoplexy. In the same way Mr. Paget has shown, that particles of cancerous matter may be brought from remote organs to the right side of the heart and thence transmitted to the lungs; where they become arrested in the pulmonary capillaries, and so induce stagnation and subsequent changes in the blood.

Prognosis.—This must always be very guarded. For the patient not unfrequently dies outright, simply from the formation of the clot and consequent obstruction. Or, when arising in a serious disease, such as croup, the occurrence of thrombosis is like enough just to turn the balance and prevent recovery; though there may be only retarded, not annihilated, circulation. Again, this event sometimes hastens death in an incurable disease, such as cancer; when, without a complication of the kind, the sufferer might survive for many months. And then, lastly, by cutting off the main supply of blood to a limb the clot may induce gangrene; the distressing effects of which will certainly be recovered from with difficulty, if at all. Thus the sources of danger exist not only in the interruption of the blood-current, but also in the morbid condition of the system produced by the disturbed nutrition of a limb or organ.

Post-mortem Appearances.—When a fibrinous deposit is found in the heart, it often becomes a question whether this was produced during life or after death. Supposing the fibrin to have separated after death—the blood being stagnant—it forms only a light-colored layer on the upper part of a red clot. On the contrary, when the deposition has taken place during life—the blood being in motion—we find a mass which is modelled to the cavity containing it, which is adherent to the walls, and which is grooved by the blood that has passed over it. In some instances also, the solidified fibrin has been seen lining one of the cavities of the heart like a false endocardium; or else, forming an additional coat to the aorta or other large vessel, without obstructing it.

According to some writers the fibrinous masses, or thrombi, occasionally soften in their centres: and they are then discovered containing a fluid of a dirty reddish-brown color, or of a lighter hue resembling pus. Examined microscopically no pus-corpuscles can be found in this fluid, and hence it is a puriform—not a purulent substance. If the process of softening goes on to a great extent, there may be seen only an outer shell or cyst remaining. Occasionally, it is said, the walls of this cyst get ruptured; and the contents becoming mingled with the blood, poison this fluid as effectually, and give rise to the same typhoid symptoms, as if disorganized matter had been injected directly into a vein. Without denying the possibility of this occurrence, I must say that it seems to me to be one which only happens very rarely. It need scarcely be pointed out, that this event is very different to the so-called poisoning of the blood from the presence in it of disintegrated portions of fibrin.*

* The nature and size of this treatise preclude my entering into many arguments which need discussion on this interesting matter; but I would refer those who wish

Treatment.—Sufficient has been already said to prove, that the indications which lead to a rational treatment are very different in different cases. Thus, in some urgent instances, all our efforts have to be directed to keeping the patient alive at the time, without caring for the after-consequences. In other cases, the relief of pain, the compensatory establishment of a collateral circulation, and the prevention of the transference of fresh emboli, are the objects to be held in view. Or, again, the attempt is sometimes made to produce solution of the clot, or its partial organization. While in a fourth class (according to some physicians), the poisoning of the system by the purulent and ichorous destruction of the clot, will have to be combated.

The remedies upon which we have learned to rely are few, and it must be confessed that their action is uncertain. When there is great prostration, stimulants will of course be needed: either ammonia, or ether, or brandy, usually proving very valuable. Then in all instances, the strictest quiet must be imposed; both as regards the position or movements of the patient, and the absence of every circumstance calculated to prevent repose. The sick-room is to be freely supplied with pure air. Such nourishment as essence of beef, raw eggs, and milk ought to be freely administered; these being given in small quantities, frequently repeated. Bleeding, leeching, blistering, or purging must not be thought of.

The admirable series of experiments by Dr. Richardson has taught us that all the alkalies are resolvent—*i. e.*, they lead to solution of nitrogenous tissue. This gentleman's researches prove, that after death from the alkalies and from antimony and from many of the alkaloids (as strychnia, morphia, and atropia) there is the same fluidity or partial fluidity of the blood, the same dissolution of the blood-corpuscles, the same softening of the soft parts, the same absence of cadaveric rigidity, and the same extensive but simple vascularity of mucous surfaces and vascular organs. In the carbonate of ammonia we have an admirable agent; since it is not only possessed of the same power as the other alkalies, but it has also the valuable property of exciting the heart and circulation, as well as the muscular system. This agent, freely diluted, may then always be administered, unless there is evidence that it is present in excess in the blood and breath; while very often it may advantageously be combined with bark (F. 371). The conclusion must not be drawn from these remarks that ammonia is the agent which keeps the blood, in the living body, in a fluid state. Before this view was abandoned by Dr. Richardson himself, the theory had been deemed wholly untenable by several authorities. Nevertheless, those who most differed from him still allowed he had proved that ammonia is contained in the blood in larger quantities than was previously supposed, and that added to coagulated blood (out of the body) it is capable of again rendering it fluid.

Another remedy of great value in these cases is opium; for it not only quiets the circulation, but it relieves pain and calms the depressing fears as well as the nervous restlessness. The dose must be sufficient to accomplish these objects. And lastly, to remove that low state of health which both favors thrombosis and the degeneration of tissues injured by a clot, when formed, we must trust to a good nourishing diet, the effects of pure air, and the administration of quinine (F. 379) or of sulphurous acid (F. 48).

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to investigate it further, to the writings of Virchow, Cohn, Richardson, Gulliver, Humphry, Paget, Kirkes, and John W. Ogle. There are also two excellent articles on this subject in the British and Foreign Medico-Chirurgical Review, for July, 1861, and January, 1863.

Where the result is successful, the practitioner had better be prepared to find that the necessarily tedious convalescence has excited the displeasure of the patient's friends, who are generally unreasonable in proportion to their inability to comprehend the simplest facts in medical science. Annoyance at this circumstance will, however, be lessened by remembering the great danger from which the sufferer has been rescued; as well as by recollecting that if the physician now and then gets blame where he deserves great credit, he also frequently receives much higher praise than is merited.

11. **HÆMATOZOA.**—In the writings of old authors, from the time of Pliny, cases are to be found recording the presence of animalcula in the blood [*hæmatozoa*, from *Αἷμα* = blood + *ζῶον* = an animal]. The physicians of the present day have also published examples of this occurrence; but while the statements of some of these gentlemen have been confirmed by independent observers, those of others have been refuted. Thus, Bushnan has reported the case of a boy affected with influenza, in whose blood worms half an inch long were detected an hour after bleeding. According to Rhind, however, these were merely the larvæ of the *Tipula oleracea*, a fly which is so abundantly found in summer in ditch and river water; or, according to Von Siebold, they consisted of the red larvæ of the *Chironomus plumosus*, frequent in water-barrels. Of course they were accidentally introduced into the blood after its withdrawal from the body. Again, Goodfellow met with an instance in which animalcula, varying in length from $\frac{1}{500}$th to $\frac{1}{800}$th of an inch, were present in the blood of a fever patient; but it is impossible to say what they really were.

The *Distoma hæmatobium* (Bilharzia hæmatobia) was first discovered by Bilharz, in Egypt, during 1851; where it is so common, that nearly half of the adults are supposed to be infected with it. This entozoon inhabits the vena portæ, as well as the mesenteric, and hepatic, and bladder, and intestinal veins. Its habitat is the blood; and hence it may be carried into other parts than those just mentioned. It is not hermaphroditic, the two sexes being very dissimilar. The male is much larger than the female, being about half an inch in length. On the under surface of the cylindrical body, extending from just below the ventral sucker to near the end of the pointed tail, is a kind of groove or deep slit (canalis gynæcophorus); in which the female is lodged during copulation. The latter is more filiform and narrower, though rather longer, than the male. Moquin-Tandon is in error in believing that the female is the superior, and that she lodges the male. These remarkable parasites are very prevalent in those persons who drink the unfiltered waters of the Nile, and who consume fish from this river in a half putrid state. The symptoms produced are those of general constitutional disturbance; together with diarrhœa, chlorosis, pyelitis, bloody urine, &c. Death ultimately ensues from vital exhaustion; or earlier from some complication like pneumonia, ulceration of the intestines, &c. This hæmatozoon is probably also the cause of a peculiar form of hæmaturia which is somewhat prevalent in Southern Africa, and in the Mauritius. The principal remedies which have been used against these trematode helminths are calomel and turpentine; though the efficacy of such drugs must be very problematical. More benefit will probably ensue from attempts to mitigtate the symptoms as they arise. Relief can often be given where a cure is hopeless.

A second species of Bilharzia (*Bilharzia magna*) has been discovered by

Dr. T. S. Cobbold, in the portal system of an African monkey—the Cercopithecus fuliginosus.

The *Hexathyridium venarum* (Polystoma sanguicola) is about three lines in length. This helminth has been detected in venous blood, as well as in the sputa of two young persons suffering from hæmoptysis.

MM. Gruby and Delafond have often detected a species of microscopic threadworm in the blood of the dog. These filariæ are found in great numbers; they have a diameter less than that of the blood-disks, and they circulate in the most minute capillaries. In about four or five per cent. of dogs, the blood is said to be verminous. It has been proposed to give to this hæmatozoon the name of *Filaria papillosa hæmatica canis domestici*.

Andral discovered true *hydatids* in the pulmonary veins of a man aged fifty-five; but it is very doubtful if they were developed there, having been probably introduced through some perforation in the walls of the vessels. And lastly, it is, no doubt, true, that the *Fasciola hepatica* (the liver fluke) has been found in the vena portæ. M. Duval, a physician at Rennes, while dissecting the body of a man forty-nine years of age, came upon a large specimen in the trunk of the portal vein, in the midst of a little fluid blood. In tracing the hepatic divisions of the vein, he discovered four or five other helminths of the same kind; all of which were about one inch in length, and half an inch in width. There were none in the mesenteric branches which form the portal vein, and no disease was detected in the liver—or, indeed, in the body—excepting the flukes. The fasciola hepatica, and the distoma lanceolatum, are often found together in great numbers in the gall-ducts and bladder of the sheep, and other graminivorous animals, producing a disease known as the *distemper* or *rot*.

II. SCURVY.

Scorbutus, or scurvy, is a complex morbid state, caused by long-continued privation of fresh, succulent vegetables or fruits, or their preserved juices. Insufficient animal food, the excessive use of salt meats, sameness of diet, foul drinking-water, inattention to personal cleanliness, exposure to impure air, mental despondency, and the ill-effects of previous attacks of ague or dysentery—these can all exert a predisposing influence, but nothing more. Such conditions will also intensify the ravages of this disease, though they cannot, by themselves, produce it.

Of late years, scurvy has been seen with comparative rarity in this country; although examples of it are occasionally met with amongst the aged inmates of asylums, workhouses, &c., who have, perhaps, been long living on tea with bread and butter. After the failure of the potato crop in 1846, numerous instances occurred amongst the working classes in many parts of the United Kingdom. In our navy this disorder has been gradually becoming extinct since the year 1795, when an Admiralty order was first issued for furnishing the fleet with a regular supply of lemon-juice. But bad cases still not unfrequently occur in the mercantile service;*

* Dr. Robert Barnes, in his Report on Scurvy in the Merchant Service (Sixth Report of the Medical Officer of the Privy Council, with Appendix, 1863), shows that during the twelve years, 1852-63, no less than 1058 cases of this disease have been

recent Arctic navigators have also suffered from it; while both the English and French armies, in the Crimea were attacked with it to a remarkable extent. The mortality from scorbutus was formerly frightful; more seamen dying from it than from all other causes put together, not omitting the accidents of war. Thus, Admiral Hosier sailed from England for the West Indies, in 1726, with seven ships of the line, and twice lost his whole crew by scurvy. Again, two years after Lord Anson's memorable expedition sailed from England in 1740, this disorder had proved fatal to four out of every five of the original crews. So likewise, in 1795, the safety of Lord Howe's Channel fleet was seriously endangered by its virulence. Now by taking care to supply the men with fresh, succulent vegetables, or fruits, or their preserved juices, the circumnavigation of the globe may be accomplished without the loss of a hand from it. When, therefore, a sailor dies from scurvy, some one ought to be as responsible as if the fatal event were due to criminal neglect. At the present time, the ships to and from India and China, which are at sea from ninety to one hundred and fifty days, are said to be those which produce most sufferers from this preventable disease. It rarely begins to manifest itself under fifty or sixty days from the time of leaving port.

Our knowledge of the *pathology* of this disease is not very precise. There can, however, be little doubt that the blood is altered in composition; but if it be asked what ingredients are deficient, or in excess, or deteriorated in quality, we can only point to statements which appear very contradictory. The red corpuscles are probably much diminished, while those present may be imperfectly organized; the albumen being also lessened, and having its solubility increased. Perhaps the saline constituents are deficient in amount, the water and fibrin being increased. Dr. Aldridge holds that the real cause of scurvy is a deficiency in the food of certain minerals which are essential to the existence of nearly all the proximate principles by which the animal structure is built up. These principles are phosphorus, sulphur, lime, potash, and soda. And he finds that both seeds and flesh are usually deficient in sulphur and the alkalies. Dr. Garrod in some measure confirms this view; for, while attaching little importance to the absence of sulphur and soda, he still believes that the blood contains an inadequate amount of potash, and that all antiscorbutics owe their virtues to the quantity of this salt they contain. He says, moreover, that scorbutic patients will recover when some of the salts of potash are added to their food, without the use of succulent vegetables or milk.

The *symptoms* of scurvy show themselves gradually, commencing with a peculiar dirty pallid condition of the skin, and a somewhat leaden hue of the features. Almost simultaneously, or even previously in some instances, there is a sense of lassitude and indolence, mental anxiety, and an offensive state of the breath. Petechiæ appear on the legs; complaint is made of a kind of rheumatic stiffness of the muscles, as well as of wearying pains in the bones; and there is also a pale exsanguine appearance of the gums, with dyspnœa on the least exertion. The appetite, however, often con-

admitted into the Hospital ship, Dreadnought; the total number of in-patients for this period being 25,486. In the year 1863 alone, this institution received 86 cases of scurvy: 1 patient in every 23 of the whole number admitted being afflicted with this preventable disease. Since the publication of this Report, the admissions for scurvy into the Dreadnought have been as follows: For 1864, 83 cases, with 2 deaths; 1865, 102 cases, with 4 deaths; for 1866, 101 cases, with 7 deaths; for 1867, 90 cases, with 5 deaths. Of the 18 fatal cases, in 15 there were complications. (Letters to the Author from Mr. Harry Leach.)

tinues good, and digestion is well performed; while in the very aged, the callous and toothless gums remain healthy all through the disease. Hemeralopia and nyctalopia—peculiar forms of partial amaurosis, possibly due to imperfect nutrition of the retina—have now and then been noticed amongst the earliest symptoms. Then, in the second stage, the symptoms are all intensified. The countenance gets sallow and of a dusky hue; the gums swell, are spongy, of a livid color, and bleed on the slightest touch; the teeth loosen, and the breath becomes still more fetid. As the disease still further advances, the debility greatly increases; the dyspnœa often becomes most urgent; the gums frequently slough; and hemorrhages occur from the gums, and mouth, and nose, from the stomach and intestines. Ecchymoses, or effusions of blood beneath the skin, also appear, especially on the lower extremities and trunk, many parts of the body becoming so greatly discolored with bruise-like marks that the patient appears as if he had been severely beaten. The legs swell, and attempts to move them give pain; indurated tumors occasionally form in the extremities, from the effusion of a fibrinous material into the connective tissue, or between the bone and periosteum; there is stiffness and contraction of one or more joints; and putrid fungoid ulcers arise, which have a tendency to bleed copiously. Moreover, trifling abrasions are apt to take on an unhealthy action, and to become converted into fetid ulcers; while, without care, bed-sores will form. There is also horrible despondency; the skin is dry and rough; the urine is scanty; in some instances there has been spontaneous salivation; while there is at one time diarrhœa, and at another constipation. Unless relieved the heart's action gets very feeble; and at the end of some weeks the patient either sinks from a sudden sharp attack of diarrhœa or dysentery, or from extensive effusions of bloody serum into the pleuræ or pericardium, or he more slowly dies from exhaustion. In many instances, too, some slight exertion has been immediately followed by fatal syncope; at times, probably, from the formation of a thrombus or clot in the heart or in one of the large arteries.

In the *diagnosis* of pure scurvy no difficulty is likely to arise, since there is only one affection with which it can be confounded—purpura. From this it is to be distinguished by the gradual way in which the symptoms come on, and the cause; for purpura often appears suddenly, and is in no way due to abstinence from fresh vegetables. In purpura there is no sponginess or lividity of the gums, the skin of the trunk is seldom of a dusky hue, nor is the disease prevented or cured by antiscorbutic remedies.

But it must be recollected that the symptoms of scurvy are often masked by its being associated with dysentery, typhus, typhoid fever, pneumonia, &c. Thus, I believe that during the first six months of the British army being in the Crimea, the hospital returns showed but an insignificant number of cases of scurvy; though many of the medical officers remarked, that almost every admission was complicated by the existence of the scorbutic taint. It was subsequently that pure scurvy broke out so disastrously both amongst the French and English troops.

The *treatment* resolves itself into keeping the patient warm in a pure atmosphere, while we administer some one or more of the well-known antiscorbutics. The chief agents of this class are lemon- and lime-juice,* oranges, shaddocks, sauer-krout, salads, watercresses, potatoes, greens,

* For the preservation and mode of using lime- or lemon-juice the following Notice to Ship-owners was issued by the Board of Trade in September, 1865: (1) Every ship on a long voyage should be supplied with a proper quantity of lime- or lemon-juice. (2) The juice having been received in bulk from the vendors, should be examined and analyzed by a competent medical officer. All measures adopted

onions, carrots, radishes, dandelion, common sorrel, pickles, &c. Dr. Lind in his work on scurvy, published in 1757, clearly proved the efficacy of oranges and lemons in preventing this disease; though his earnest suggestions to the government were but little heeded for nearly forty years. To check the hemorrhage, gallic acid (F. 103) may be required, or what will sometimes answer better—iron alum (F. 116) or tincture of perchloride of iron (F. 101); for the purging, the liquid extract of bael (F. 97), or a mixture of rhatany or catechu (F. 96, 97); and to strengthen the gums, either an astringent gargle (F. 250, 252) should be recommended, or the tannic acid lozenges (half a grain in each) of the British Pharmacopœia. In addition to these remedies, plenty of milk, raw eggs, nourishing soups, pounded meat with potato or cabbage or onion, together with wine or cider or perry or ale, must be allowed. Spruce beer (F. 7) has been found especially useful, and is an agreeable drink. Then, as soon as the state of the gums and the digestive organs will permit of it, good and copious meals of ordinarily prepared fresh meat and vegetables should be given.

If we believe in the soundness of the views of Drs. Aldridge and Garrod, and if we wish to administer physic, or if we have not the power to regulate the diet, we may employ the acid tartrate, chlorate, or phosphate of potash—F. 61, 356, 358, &c. The nitrate of potash must be avoided; since according to Dr. Bryson, it has been found to exert a most injurious influence. Opium is sometimes needed to give sleep, and to relieve irritability. Quinine and steel often produce excellent results in hastening recovery. In all severe cases the recumbent posture should be strictly maintained; as fatal syncope is not unlikely to arise from any cause which in the least degree impedes the force of the heart's action. Moreover, the occurrence of bed-sores will have to be guarded against by putting the patient on a water mattress.

When Dr. Kane was in the Arctic Regions, and had several of his crew struck down with scurvy, he applied his medical knowledge to good purpose. He says,—"Among other remedies which I oppose to the distemper, I have commenced making sundry salts of iron; among them the citrate and a chlorohydrated tincture. We have but one bottle of brandy: my applying half a pint of it to the tincture shows the high value I set upon this noble chalybeate. My nose bled to-day, and I was struck with the fluid brickdusty poverty of the blood. I use iron much among my people; as a simple remedy it exceeds all others, except only the specific of raw meat: potash for its own action is well enough to meet some conditions of the disease, and we were in the habit of using freely an extemporaneous citrate prepared from our lime-juice; but as our cases became more reduced and complicated with hemorrhages, iron was our great remedy." And again, mentioning the fortunate capture of a couple of rabbits, he adds, that by keeping them carefully covered up, they reached the ship sufficiently unfrozen to give about a pint of raw blood. It was "a grateful cordial to Brooks, Wilson, and Riley;" three of the worst cases.*

for its preservation are worthless, unless it be clearly ascertained that a pure article has been supplied. (3) Ten per cent. of brandy (S. G. 930) or of rum (S. G. 890) should afterwards be added to it. (4) It should be packed in jars or bottles, each containing one gallon or less, covered with a layer of oil, and closely packed and sealed. (5) Each man should have at least two ounces (four tablespoonfuls) twice a week, to be increased to an ounce daily if any symptoms of scurvy manifest themselves. And (6) the giving out of lime- or lemon-juice should not be delayed longer than a fortnight after the vessel has put to sea.

* Arctic Explorations, pp. 286, 288. London, 1861.

To prevent an outbreak of scurvy in individuals so circumstanced that its occurrence is to be feared, attention must be paid to the following points. Supposing that fresh animal and vegetable food cannot be obtained, care ought to be taken that every one is daily supplied with some antiscorbutic principle—such as is found in lemon-juice and other materials already described. The air which is breathed must be pure. The quarters, huts, tents, cabins, &c., of the troops, or sailors, are to be dry, warm, and wholesome, and properly drained. A fair amount of bodily exercise is to be taken every day; clothing wet from perspiration, or rain, or snow, being afterwards changed, if possible. And lastly, with men in camp, or compelled to winter in the Arctic Regions, &c., every encouragement is to be given by the officers to games in the open air. Foot-ball, racing, hunting, sleighing, and such like, do much to keep off diseases of all kinds. A great deal may also be done to lessen the monotony of long evenings, by supplying interesting books, music and singing, and drafts or chess, or backgammon; while private theatricals form an almost endless source of amusement, what with the rehearsals and different arrangements which such performances of necessity entail.

III. PURPURA.

This disease probably consists of some morbid state of the blood and capillary vessels; though the precise nature of the alteration, in its early stage, is unknown. The result is, however, that the red blood corpuscles become disintegrated, while the contents of these cells are of course diffused. Hence purpura [so called from *Πορφύρα* = a purple dye] may be said to be characterized by the occurrence of sanguineous effusions into the cutaneous and mucous tissues of the body; producing red or claret-colored maculæ, which die away to be succeeded by fresh eruptions in adjoining patches of skin. When the hemorrhagic spots are very small, they are termed *petechiæ;* when larger, perhaps owing to the fusion of several petechiæ, they are known as *vibices;* while where there are considerable patches of extravasated blood, the blotches are spoken of as *ecchymoses.* All these marks have this character in common,—they do not disappear or fade on the use of pressure.

Purpura was placed by Willan in the class of exanthematous diseases. He enumerated five varieties of it. These are *purpura simplex, p. urticans, p. hæmorrhagica, p. senilis,* and *p. petechialis* or *contagiosa.* Such a subdivision seems, however, to be a very unnecessary refinement. It is sufficient to adopt the two old divisions generally employed in the present day,— viz., that of purpura simplex and p. hæmorrhagica. The first is frequently a trifling affection; which has its origin in mal-assimilation, and can usually be soon corrected. Not so with the second variety. For in addition to the cutaneous hemorrhage being frequently considerable, the blood is often poured out freely beneath the mucous membranes; while if there be much degradation of this fluid, copious effusion may take place into the serous cavities, the stomach and intestines, the air-tubes, or the bladder, &c.

The *causes* of purpura are obscure. Sometimes it seems due to the excessive use of salt provisions, or of pork preserved in nitrate of potash. The disease known as "black leg," which occurs amongst the lumber men

on the Ottawa or grand river of Canada, is merely a form of purpura; being produced by a diet of bread with tea, and pork saved from decomposition by packing in saltpetre. In several instances the origin of purpura can be traced to insufficient food, with the other ills of poverty; to chronic exhausting affections; to ichorhæmia; to degenerations of the liver or spleen; to Bright's disease; to intemperance; and to long-continued mental anxiety. One of the most troublesome cases, as regards duration, which I have seen, was due to a daily loss of blood from large hæmorrhoids. The patient had consulted other physicians without deriving any benefit from the remedies suggested; but he had never mentioned the piles. He thought they were of no consequence; although he never went to stool without losing a tablespoonful of blood, and frequently much more. I am not sure that purpura has not occasionally some connection with a nearly worn-out syphilitic taint: a taint sufficient to produce anomalous symptoms difficult of explanation, and yet not powerful enough to give rise to any of the ordinary secondary or tertiary symptoms. Possibly also this morbid state of the blood will be found to arise in cases of chronic poisoning by arsenic, mercury, &c.

The *symptoms* in simple purpura are often unimportant. They consist almost entirely of successive eruptions of red spots, with more or less evidence of impairment of the functions of digestion and secretion. In a typical example of the more critical form of this disease, the chief points which attract attention are the great languor and debility; the patient's appearance testifying that he is very much out of health. There is a sallow, rather than a dusky, complexion; and sometimes a slightly puffy state of the features. Bleeding from the nose is common. In addition, we find much mental depression; bad appetite, sometimes alternating with an inordinate craving for food; pains about the epigastrium; palpitation of the heart; together with attacks of giddiness on making any exertion, dimness of vision, faintings, constipation, &c.

The petechiæ, or vibices, or ecchymoses generally appear on the legs first, and then on the trunk. They are of variable size, from minute dots like flea-bites, to patches several inches in extent; while they are occasionally of a scarlet color, and sometimes of a dark livid hue, giving the appearance presented by recent contusions. As they fade away, they assume a dirty yellow tinge. In exceptional cases there are severe pains in the muscles, as well as in the textures around the joints; the suffering being usually attributed to rheumatism. Occasionally I have found that as a fresh crop of petechiæ has come out, the pains have been much relieved; the latter again getting aggravated as the spots have died away.

The mere fact that the prominent feature of purpura is an exudation of blood from the cutaneous capillaries, would lead us to fear that simultaneously hemorrhage might take place into the substance of the mucous membranes, &c.; and not only is such the case, but it is this occurrence which renders purpura hæmorrhagica a dangerous affection. As a rule, in fatal cases, blood is found copiously effused into the mucous lining of the whole digestive tract from the mouth to the anus; beneath the serous membranes of the heart, lungs, and abdomen; between the arachnoid and pia mater, or even into the cerebral substance; into the urinary passages; as well as into the muscular and glandular tissues. Another characteristic change, moreover, is to be detected in the spleen; which is enlarged and softened, as well as studded with pale yellow spots. By some authorities this condition of the spleen is regarded not as the effect of the disease, but as its cause.

Purpura may be complicated with, or it sometimes occurs during the

progress of, other diseases. Thus, it has been met with in rheumatism and gout; in urticaria, eczema, and other skin diseases; in dropsy; in various important affections of the liver, kidneys, &c.; and as a sequela to the different eruptive and continued fevers.

The *treatment* should consist in the exhibition of full doses of sulphate of soda with sulphuric acid (F. 143), or of castor oil, until the bowels are thoroughly cleared. Then, according to circumstances, recourse is to be had to quinine and iron (F. 380); or to the mineral acids (F. 376, 378, 379); or to quinine, steel, and arsenic (F. 381); or to phosphate of iron, &c. (F. 405, 406). A good nourishing diet, fresh fruit or vegetables, a fair allowance of stout or ale or wine, and rest in a pure atmosphere, will be indispensable. The oil of turpentine, in small but frequently repeated doses (F. 50), has been strongly recommended where there is internal hemorrhage. A tincture prepared from the inner bark of the common larch (Larix Europæa), administered in fifteen-minim doses every three or four hours, would at least prove more agreeable. As a rule, however, I feel more confidence in a mixture (F. 103) containing the gallic and aromatic sulphuric acids.

IV. HYDROPHOBIA.

Of the diseases which may arise from inoculation with poisons generated by unhealthy animals, hydrophobia [*Ὑδωρ* = water + *φοβέω* = to dread], or rabies [*Rabio* = to rave], is the most remarkable as well as the most distressing. It, is indeed, a fearful malady; not only on account of its almost universal fatality, but also because of the horrible suffering it gives rise to. Rabies is generally believed to occur spontaneously in the canine and perhaps in the feline races; but it is not unlikely that this opinion is opposed to truth. Certainly, the disease is only communicated by inoculation with the saliva to other animals and to man.

Pathology.—The symptoms, together with the absence of any constant structural change, seem to show that this disease depends upon some peculiar alteration in the blood; this alteration affecting the nervous system, and especially the medulla oblongata with the three divisions of the eighth pair. The poison, when absorbed, may reasonably be supposed to slowly effect some change in the blood, while at the same time the morbid material increases in quantity and virulence. The process by which this occurs has been compared to that which happens in fermentation. According to some authors, a double zymosis or fermentation takes place; first in the part wounded, and secondly in the system at large. The question is often asked, Is the disease due to the slow operation of the poison on the system, or to the mental anxiety which the patient undergoes from the consciousness of his danger? Although our knowledge of the nature of this affection is very imperfect, still I know of no reason for believing that anxiety will give rise to hydrophobia any more than it will produce variola or syphilis. But just as we meet with imaginary cases of the latter (syphiliphobia), so we read of mental or hysterical hydrophobia—to be cured by bread pills. Whether in a rabid animal other secretions than the saliva are poisonous is not absolutely certain; but it is exceedingly probable that they are so.

Stage of Incubation.—Speaking with much latitude, the stage of *incubation*, or of *delitescence* as it is sometimes called, may be said to vary from thirty days to eighteen or twenty months; the duration perhaps depending

upon the virulence and quantity of the poison, as well as upon the constitution and age of the party inoculated. The period appears to be shorter in very young persons than in those more advanced in years. Exceptional cases are recorded where the symptoms have set in as early as the eighth day; while others are known in which their appearance has been delayed for four, five, and seven years. In one instance, related by Dr. Bardsley, it is said that twelve years intervened between the bite and the first hydrophobic symptoms.* Probably, in the greater number of cases, the latent period has lasted from one to two months.

In 1862, M. Renault published the results of some experiments which had been conducted with the object of learning the time of incubation in the dog. From these it appears, that of 131 dogs bitten by mad dogs, or inoculated with hydrophobic slaver, 63 remained well at the end of four months. The disease was developed in the other 68 after intervals varying from five to one hundred and twenty days. Thus:

In 25 dogs the disease set in between the	5th	and 30th day.
31 "	30th	" 60th "
7 "	60th	" 90th "
5 "	90th	" 120th "

Symptoms.—The pathognomonic signs of hydrophobia, in the human subject, are: Cramps of the muscles of the pharynx and thorax; spasmodic action of the diaphragm; a great dread of fluids; a recurrence of paroxysms of phrensy on attempting to drink, or on exposure to a current of air; a flow of viscid saliva ("hydrophobic slaver"); restlessness and terrible anxiety; delirium, with exhaustion or coma, ending in death.

To consider the symptoms at greater length, we will suppose that a man has been bitten by a rabid animal. After the lapse of the period of incubation, the short stage of *recrudescence* sets in. Complaint is usually made of mental uneasiness, chilliness, languor, and lassitude; there is restlessness also, loss of appetite, and more or less headache. Sometimes a sensation of numbness, or even of great soreness in the bitten part is experienced. But in any case the precursory symptoms are followed at the end of one, two, or three days by the *confirmed* or *hydrophobic* stage of the disease. This commences generally with considerable agitation and garrulity, peculiar rapid movements of the eyes, frequent sighings, nausea, and fever; to which rapidly succeed stiffness of the neck, difficulty of breathing and swallowing, a horror of liquids, and a frightful sense of suffocation. The face has an expression of great alarm. There is an excessive secretion of tenacious saliva, causing frequent hawking and spitting; each expectoration perhaps being accompanied by a shudder. In addition to sleeplessness, spectral illusions are common. Amongst other symptoms of general hyperæsthesia, there is sometimes priapism with seminal emissions; or in women, there may be nymphomania. A frequent desire to pass urine is repeatedly noticed. There now set in violent spasmodic convulsions of the whole body; the paroxysms being occasioned especially by the sight of liquids, or the sound of running water, or any attempt at drinking. The impetuous terror inspired by the sight of water has been well described by Dr. Marcet, who, in relating the history of a case of hydrophobia, says: "On our proposing to him to drink, he started up and recovered his breath by a deep convulsive inspiration; yet he expressed much regret that he could not drink, as he conceived the water would give him great relief, his mouth being evidently parched and clammy. On being urged to try, how-

* Medical Reports of Cases and Experiments, &c., p. 237. London, 1807.

ever, he took up a cup of water in one hand and a teaspoon in the other. The thought of drinking out of the cup seemed to him intolerable; but he seemed determined to drink with the spoon. With an expression of terror, yet with great resolution, he filled the spoon, and proceeded to carry it to his lips; but before it reached his mouth his courage forsook him, and he was obliged to desist. He repeatedly renewed the attempt, but with no better success. His arm became rigid and immovable whenever he tried to raise it towards his mouth, and he struggled in vain against this spasmodic resistance. At last, shutting his eyes, and with a kind of convulsive effort, he suddenly threw into his mouth a few drops of the fluid, which he actually swallowed. But at the same instant he jumped up from his chair, and flew to the end of the room, panting for his breath, and in a state of indescribable terror."*

About the *second day* the symptoms become more severe. The thirst gets distressing, and yet the patient dare not attempt to drink. "Miserrimum genus morbi; in quo simul æger et siti et aquæ metu cruciatur: quo oppressis in angusto spes est."† The viscid saliva clings to the fauces. There is uneasiness or pain at the epigastrium, and flatulence. The countenance is anxious, and indicative of horror or despair; the forehead is perhaps covered with a cold clammy sweat; and there is generally much mental distress, with excessive irritability, though the intellect remains perfect. Then, as the fatal issue quickly approaches, the sense of suffocation grows more urgent; while the surface of the body has become so sensitive that a draft of cold air, or the lightest touch, will suffice to bring on convulsive paroxysms. The senses of hearing and vision get morbidly acute. The saliva is more difficult to expel, though the attempts at spitting are incessant; or the secretions of the mouth flow away at the angles of the lips, owing to the dropping of the lower jaw from paralysis. Occasionally there is frequent micturition, but only small quantities of urine are passed. And then, at length, the terror becomes succeeded by wild delirium, which ends in exhaustion and death. Sometimes there is a great mitigation of suffering for a few hours before death. The patient becomes tranquil; perhaps falls into a quiet sleep, or into a state of deep coma, and then dies without a struggle.

Prognosis.—Very few cases of recovery are known. The general duration of the disease is from two to four or even six days, counting from the commencement of the confirmed stage. The deaths registered in England from hydrophobia during the eleven years, 1856 to 1866 amount to ninety-three. More than one-third (36) of these occurred in 1866 alone; the largest number in any single year since registration was commenced. In 1851, the fatal cases amounted to twenty-five. Considering that the population during the middle of the year 1866 was estimated at 21,210,020, we have an approach to two cases of hydrophobia to each million of people. In 1865, however, the fatal cases did not bear half this proportion. There is every reason to believe that only a small number of those bitten by rabid animals suffer from hydrophobia. When the bite is inflicted through the clothes, the latter will possibly remove the virus from the teeth. As with other poisons too, some individuals may be more susceptible to its influence than others. John Hunter mentions an instance in which of twenty-one persons bitten by a dog, only one suffered. The bite of a rabid wolf ap-

* Medico-Chirurgical Transactions, vol. i, p. 138. London, 1809.

† Auli Cornelii Celsi Medicinæ. Liber v (Medicamenta, et Morbi his Curandi), Cap xxvii. Written when Celsus was between 30 and 35 years of age, probably 18 A. C.

pears to be more dangerous. M. Troilliet states that of seventeen persons bitten by a wolf, ten died; and on another occasion out of twenty-three, thirteen perished. Moreover, it is possible that an attack of hydrophobia can entirely go off after the premonitory symptoms have commenced. Dr. Elliotson relates—*Lancet*, May, 1829—the following instance: Two little girls were bitten in the face by the same dog, while they were standing at their father's door. She who was bitten the second became hydrophobic and died. The other, at exactly the same time, experienced precisely the same premonitory symptoms as her sister—heaviness and general indisposition—but they all went off.

Mr. Youatt has proved that hydrophobia has occasionally a favorable termination in the dog. In this animal, the prominent symptoms are an alteration in the bark, which becomes a kind of howl; a rough staring condition of the coat; a peculiar movement of the eyes; together with a continued biting and swallowing of straws, hairs, pieces of paper, &c. Usually there is no fear of water. On the contrary, drink is greedily sought; although the spasms of the pharynx may prevent its being swallowed. If there is a falling of the lower jaw from paralysis, the bark is lost; a form of disease which is consequently spoken of as *dumb rabies*. Death usually occurs between the third and eighth days.

Morbid Anatomy.—The rigor mortis is of short duration. The depending parts of the body are usually very livid. The fauces and pharynx are vascular, and sometimes covered with lymph. The lungs will perhaps be congested, and the bronchi loaded with tenacious frothy mucus. In some cases, the stomach and intestines have presented evidence of partial inflammatory action. But the most constant morbid appearances are detected in the brain and spinal cord; the meninges being congested, fibrinous coagula being present in the sinuses, the ventricles containing a slight excess of fluid, and blood or serum being effused around the cervical portion of the cord. Occasionally there has been a complete absence of any discoverable lesion in the body.

Treatment.—This must be prophylactic, for the cure of the disease seems in the present state of medical knowledge almost hopeless.* The wounded part is to be excised as soon as possible after the bite; care being taken to remove every portion touched by the animal's teeth, and to obtain a clean raw surface. Even if some days have elapsed from the infliction of the wound, excision had better be resorted to. The operation can do very little, if any, harm; while by the aid of chloroform it is rendered painless. The wound is then to be thoroughly washed by a stream of water long poured over it; while lunar caustic ought afterwards to be applied. Mr. Youatt prefers the nitrate of silver freely used, to every other caustic; and he also recommends that after its application the wound be quickly healed, though many authorities advise that it should be kept open by irritating ointments. Subsequently, it might be worth while to prescribe a course of Turkish baths; so as to aid the elimination of any poison which may have been absorbed prior to the use of the knife.

In treating the disease itself, I would resort to subcutaneous injections of atropine, or of morphia, or of both in combination, to quiet the nervous

* The wonder-working herb with which the Arabian physicians treat this disease has not yet arrived here. Well might Mr. Palgrave be told marvellous stories of this plant, when one hydrophobic patient after taking it discharged "several little dogs! and then recovered. Nay, the narrator professed to have seen these extraordinary puppies, and described their size, color, form, &c., with great circumstantiality."—Narrative of a Year's Journey through Central and Eastern Arabia (1862-3). Second Edition, vol. ii, p. 33. London, 1865.

system; as well as to the administration, either by the mouth or rectum, of solutions of the sulphite or hyposulphite of soda or magnesia. The reputed power of these agents in neutralizing blood poisons is worth testing, seeing that nothing better can be suggested. At the same time, sulphur fumigations can be employed. Ice should be given to suck; and perhaps its application to the upper part of the spine might afford relief. Copious enemata of warm water will possibly mitigate the thirst.

Enormous doses of opium have failed to do any permanent good; and the same must be said of belladonna, prussic acid, Indian hemp, curara, subcutaneous injections of atropine, and tobacco. Dr. Todd kept a patient under the influence of chloroform for about eight hours; but it did not seem to retard the fatal termination. So severe are the sufferings, however, that it is a great point to give even temporary relief. Dr. Marcet's patient said imploringly: "Oh, do something for me. I would suffer myself to be cut to pieces! I cannot raise the phlegm; it sticks to me like birdlime." And after trying to collect himself, he again exclaimed: "Gentlemen, don't ask me questions, I cannot say more, my feelings cannot be described!" When the case is seen early, it might perhaps prove beneficial to induce free perspiration by the vapor-bath. If the theory of a double zymosis be true, it may do good to lay open the cicatrix and induce suppuration in it. Tracheotomy has been proposed; but it would be a useless piece of cruelty to resort to it, unless the patient seemed threatened with early death from spasm of the glottis. In one case where it was had recourse to, and in which the horror of liquids had been most intense, opening the trachea allowed drinks to be partaken of freely.

The practitioner should remember that inoculation through the saliva of a patient with hydrophobia seems by no means impossible. He ought consequently to carefully guard against this secretion coming in contact, directly or by towels, with any scratch or abraded surface upon his face or hands.

V. GLANDERS AND FARCY.

The disease known as glanders in the human subject, may be defined as a malignant febrile affection, which is very contagious and possibly infectious. It is due to a specific poison received from glandered horses, asses, or mules. Glanders and farcy are essentially identical, both having their origin in the same poison. But where the effects of the morbid agent are manifested in the nasal cavities, the disease is known as *glanders;* while when the lymphatic system suffers, it is called *farcy.*

In the *horse,* glanders is a disease which has long been recognized; for, according to Mr. Youatt, few veterinary writers have published a more accurate account of it than was given by Hippocrates 2300 years ago. It is a loathsome and incurable malady; beginning in this animal with a contagious, constantly-flowing, aqueous discharge from the nostril—commonly the left. In the second stage of the disease, the discharge becomes viscid and glutinous; then it gets purulent, and the neighboring glands, especially the submaxillary, begin to enlarge; spots of ulceration soon appear on the membrane covering the cartilage of the nose; and the poor beast loses flesh and strength. His hair also comes off, the appetite fails, and there is a more or less urgent cough. As the disease steadily advances, the ulcers increase in size; the discharge is rendered bloody and offensive;

the membrane lining the frontal sinuses inflames and ulcerates; the forehead grows tender; more of the absorbents are involved; the conjunctivæ swell and suppurate; little tumors appear about the face and soon ulcerate; and farcy is now superadded, or the glanders degenerates into farcy. The progress is henceforth rapid. The deepseated absorbents are soon affected; one or both of the hind legs swell to a great size; while the discharge increases in quantity and fetidity. In short, the animal seems to present a mass of putrefaction, until at length he dies completely exhausted.

Farcy in the horse is an inflammation of the lymphatic glands and vessels, giving rise to small tumors called "buttons," or "farcy-buds," that gradually suppurate. The ulcers which form have the same character as the glanderous ones in the nose; while the virus they secrete is just as contagious. By slow degrees this virus poisons the whole system; all the capillary absorbents become inflamed; the legs and head swell enormously; and generally the disease surely runs on to a fatal termination.

In *man* the symptoms which result from the absorption of the poison may show themselves as acute or chronic glanders, or as acute or chronic farcy. The *acute glanders* is attended by suffering somewhat similar to that which occurs in the horse. The prominent symptoms are fever, great debility, and pains of a rheumatic character in the limbs; there is a profuse offensive discharge from the nostrils: while a number of pustules and tumors form in different parts of the body, which have a great tendency to suppurate and become gangrenous. This peculiar pustular eruption, which looks more like that caused by croton oil inunction than anything else, does not occur until about the twelfth day; it is accompanied by profuse fetid sweats, and sometimes by the formation of black bullæ. Abscesses appear in the neighborhood of the joints; the nose, eyelids, and face swell and perhaps ulcerate; the urine is often albuminous and loaded with renal casts; while the constitutional disturbance is shown by great weakness and delirium. The disease generally proves fatal before the twentieth day. After death, the mucous membrane lining the nasal fossæ has been found in a state of gangrene, or else it has been covered with numberless small pustules. Acute glanders is considerably more common than the chronic form. It occurs for the most part in grooms, stable-men, &c. Of fifteen cases, the histories of which were collected by Rayer, fourteen died. The length of the period of incubation is rather doubtful, but it is probably from two to eight days.*

Chronic glanders runs its course much more slowly to a disastrous ter-

* Dr. Manquet, of Tours, has related a frightful case of glanders and farcy attacking a pregnant woman. The patient was a rag-picker, living in a filthy atmosphere. The disease was caught from a miserable pony, which had been allowed to feed frequently off the same dishes with the family. The following is Dr. Manquet's summary of the train of events in the woman's illness: "Acute pleuro-pneumonia, masked at the outset by accessions of intermittent fever of a double tertian type. On the eighth day, resolution of the pulmonary inflammation, which is replaced by an extremely painful articular rheumatism. Pustular eruptions on the legs; fluctuating subcutaneous tumors in the long axis of the limb, and in the course of the lymphatic vessels (farcy). On the eleventh day a malignant pustule on the nose, which tumefies, reddens, violaceous œdema, phlyctænoid erysipelas. In four days a confluent eruption occupies all the face, and reaches as far as the right shoulder (glanders). Numerous abscesses (farcinous poisoning). Discharge from both nostrils: glandular engorgement. Fever very active towards the end: state of typhoid prostration: petechial spots over the whole body. Spontaneous accouchement on the thirteenth day: infant living (though premature). Death (of the mother), in a condition of putrefaction of the head, on the fifteenth day of the illness, the eighth of the glanderous affection." The infant lived twenty-four hours, and seems to have succumbed to mere feebleness.

mination; the fatal event being perhaps delayed for several months, or even a year or two. The symptoms consist especially of a discharge from the nostril, of offensive perspirations, and the formation of abscesses in the neighborhood of the large joints. There is gradually increasing loss of flesh and strength; the prostration which occurs being favored by attacks of diarrhœa and sickness. Out of three reported cases only one recovered.

In *acute farcy*, the inflammation begins in the lymphatics leading from the part wounded, and is followed by swelling of the glands and extensive suppuration in the subcutaneous areolar tissue. Great exhaustion soon sets in, from which, however, the patient may recover. But if a pustular or gangrenous eruption appear, together with the glanderous discharge from the nostril, the case may be looked upon as hopeless. In fifteen examples of acute farcy death resulted in ten.

Chronic farcy produces the following effects. Suppose a groom has a slight abrasion on one of his fingers, and that it comes in contact with a little of the discharge from a glandered horse. A few days subsequently a painful sore appears, which is poulticed. In a day or two an eschar forms; on removing which a deep, unhealthy ulcer is seen. Similar ulcers form about the head, upon the arm, in the course of the absorbents, and in the axilla. The health begins to suffer; while, unless the patient can take plenty of nourishment and perhaps remove to the seaside, symptoms of acute glanders will soon set in and destroy him. This unfavorable result may, however, be often averted; for out of seven cases only one died.

In *Equinia mitis* there is more or less constitutional disturbance, with a pustular eruption. If this be abundant there is high fever, followed by prostration. The disease is due to contagion from the discharge of a horse affected with the grease. The *grease*, in the horse, consists of an inflammation of the sebaceous glands of the heels. It has a tendency to spread to deeper tissues, giving rise to ulceration and large fungoid granulations. The forefeet may be affected, but much more frequently it arises in the hinder. It is contagious; and as it is the result of gross neglect and mismanagement it is never seen in the stables of respectable people. Consequently, equinia mitis is a disease unknown to grooms, coachmen, and jockeys; though occasionally the drivers of the wretched animals seen with dung-carts, in brickfields, &c., suffer from it. A cure may be effected by cleanliness, warm bathing, disinfecting lotions, mild aperients, quinine, and nourishing food. For the *treatment* of acute glanders all kinds of remedies have been ineffectually employed. Under these circumstances it is incumbent upon the physician to give a trial to any plan of treatment which affords a hope, however slight, of cure. The investigations of Dr. Polli, of Milan, on the action of sulphurous acid, have already been referred to, but the following experiment is especially worthy of recollection: Two dogs were inoculated with the discharge of glanders through the skin. To one, ninety grains of sulphite of soda were administered daily; to the other, no remedy was applied. The wound in the former healed up in a few days: in the latter animal, it opened and yielded a sanious discharge, and general infection followed. From this, the conclusion seems justifiable that the sulphite of soda or magnesia (F. 48) should be tried in man. It ought, however, to be commenced at the onset.

In chronic farcy a cure has been effected by large doses (from grs. 10 to 15, thrice daily), of iodide of potassium and bark. Arsenic with strychnia has been recommended. Quinine might prove useful. Stimulants, good nourishing food, and pure air, will be necessary in all cases. It will also be advisable to open the abscesses; and to syringe the nostrils or wash the ulcers with plenty of water containing a little chloride of zinc, or solution

of permanganate of potash, or some other disinfectant solution. The internal administration of carbolic acid, together with the application of lotions containing this medicine to the ulcers, might be anticipated to have a beneficial effect. Then, in a few cases, we could perhaps try to assist in eliminating the poison through the skin, by the repeated use of the vapor bath.

As regards *prophylactic treatment* it is only necessary to recommend free cauterization of the inoculated tissue; together with the administration of the sulphite of soda or magnesia. Fumigation with sulphurous acid gas (SO_2) ought also to be employed.

VI. FURUNCULAR INFLAMMATIONS.

1. **BOILS.**—A boil or furunculus [as if *Ferrunculus*, from *Ferveo* = to burn] is a circumscribed hard tumor, small but very painful, caused by inflammation of the true skin and subjacent areolar tissue. Suppuration takes place slowly and imperfectly; the skin ulcerates, and allows of the escape of a little pus; and then in two or three days a slough of the connective tissue (the core) is discharged from the centre. Boils most frequently form on the back of the hand, the nape of the neck, the armpit, the nates, about the vulva, or on the thighs. In many cases three or four are met with in different situations, at the same time; successive crops appearing, to the great annoyance of the patient.

Causes.—A boil is always to be regarded as evidence of malnutrition. Hence the most common causes are a residence in an impure atmosphere; insufficient or improper food; sexual excesses; overwork or mental anxiety; and, in short, anything which leads to deterioration of the blood. The young and old seem to suffer equally, and somewhat more than those in the prime of life.

Treatment.—Locally, warm water dressing or poultices should be applied. The most ancient poultice that we read of was made from figs: being used for a boil when Hezekiah was "sick unto death."* Unless the pain be very great, or the tissue over the swelling coarse and thick, I am convinced that it is better to let the boil break, rather than to open it with the knife. The former plan is never attended with inconvenience, whereas improper interference has more than once led to severe attacks of erysipelas.

Then, in addition to removing the cause of the unhealthy inflammation, the bowels should be cleared out by an active aperient (F. 144, 148, 150). After its operation, a good, nourishing diet must be allowed, with a moderate quantity of wine, or pure beer. As a tonic, nothing suits better than quinine (F. 379), or one of the mineral acids with bark (F. 376). When there are successive crops of boils, with or without any obvious cause, no remedy is so efficacious as a trip to the country.

2. **STYES.**—A stye or hordeolum [*Hordeolus*, dimin. of *Hordeum* = barley] is merely a small boil, of the size and firmness of a barleycorn, situated at the edge of the eyelid. It often forms in strumous and other weakly children. Fomentations and water-dressing will bring it to a head;

* "And Isaiah said, take a lump of figs: and they took and laid *it* on the boil, and he recovered."—2 Kings, ch. xx, ver. 7.

and assist the exit of a drop or two of pus, with a small slough of connective tissues. Quinine, or bark, or steel, with good diet and cod-liver oil, commonly suffice to remove the constitutional cause. If the excretions are offensive and insufficient in amount, one or more doses of a mild aperient (rhubarb and magnesia) will be needed.

3. **CARBUNCLES.**—A carbuncle, or anthrax (from *Ἄνθραξ* = coal), consists of severe inflammation of a circumscribed portion of the skin, and subjacent tissue, with infiltration of unhealthy lymph. The swelling which results is hard, flattened, and more or less circular in shape, and of a dull red color; it is tender and very painful; while it varies in diameter from half an inch to six or seven inches. The surrounding skin gets unduly sensitive, of a purplish tint, and burning hot; while there is a severe throbbing, or dull aching pain in the whole of the affected part. As the mischief progresses, the centre of the tumefaction suppurates; at first a doughy feel being communicated to the touch, with subsequently an indistinct sense of fluctuation. Then, the skin ulcerates in several small spots; from which openings a bloody purulent fluid, with shreds of sloughy connective tissue and lymph, can be squeezed. The openings gradually coalesce, until an unhealthy-looking ulceration of some size is produced: the discharge increases and gets thinner; while all the grayish sloughs separate from the living tissue and come away. If the case progress favorably, healthy granulations spring up; and the wound daily becomes smaller and smaller, until it closes. A well-marked, permanent cicatrix remains to show the extent of the mischief.

Carbuncles are most frequently situated about the nape of the neck, or on the back; the next most frequent sites being the shoulders, sides of trunk, abdominal wall, buttocks, back of the arm and forearm, and upper or lower lip. They are rare in childhood and youth; generally occurring in individuals who have passed the middle period of life. Men suffer at least twice as often as women.

Causes.—As boils are due to a vitiated state of the blood, so carbuncles have their origin in a similar though exaggerated condition. Sometimes they occur as sequelæ to one of the continued or eruptive fevers; or they arise in individuals weakened by renal disease. They are common in diabetes; the first which forms may prove fatal, if the patient's diet be too restricted in consequence of overattention to the state of the urine. Not unfrequently, carbuncles have appeared to be partly due to an unhealthy condition of the atmosphere and season. Lastly, irritating liniments, resinous plasters, and blisters, will give rise to them in cases where the predisposing influence of debility is present.

Constitutional Symptoms.—For a day or two prior to the appearance of the carbuncle the patient notices that he is not well: there is a sense of malaise, with languor and chilliness. As the inflammatory action manifests itself, the constitutional disturbance becomes marked in proportion to the extent of the morbid process; and there is headache, confusion of intellect, irritability from the pain, a sallow complexion, a feeble, rapid pulse, and a thickly-furred tongue. The bowels are usually constipated, but occasionally there is diarrhœa, with offensive and unhealthy stools. The urine sometimes contains sugar. Occasionally, we find violent fever and delirium, extreme prostration setting in early. A fatal result may ensue from exhaustion, from ichorhæmia, or from an extension of the disease to important tissues. If the Registrar-General's Report, for ten years (1857 to 1866), be examined, it will be found that the annual average mor-

tality in England and Wales, from this disease, is 237. Carbuncles, unlike boils, are generally solitary.

Treatment.—Linseed poultices, or water-dressing, or anodyne fomentations should be early employed, since they afford more relief than any other applications, and hasten suppuration. A crucial incision down to the base of the swelling, by removing the tension, often gives ease; and it may be had recourse to even before suppuration has become established. This is not to be regarded as a rule, to be carried out in all cases; but rather as a plan to be resorted to with judgment and discretion. In the old and very nervous, where there is an unconquerable dread of chloroform, I have not seen reason to regret trusting to fomentations, without recommending the knife. Subsequently, when the sloughs have all come away, a stimulating lotion (F. 264) will promote granulation and cicatrization.

Mr. French has recommended subcutaneous incisions, both for boils and carbuncles. The extent of the induration being ascertained, a tenotomy knife is passed horizontally underneath it; the blade of which is then turned upwards, and the hardened structure cut through to the utmost extremity of the induration, avoiding the skin. The disease is thus arrested in one direction; and to prevent its spreading in the other, a second puncture, at right angles with the first, is to be made, thus forming a subcutaneous crucial incision. When any bleeding, which may happen, has ceased, the whole surface of the tumor is to be covered with collodion. Immediate relief is felt, and the patient is at once able to pursue his ordinary avocations.

Mr. Prichard, of Bristol, has helped to revive the caustic plan of treatment. He not only thinks very highly of it, but is a strenuous opponent of the crucial incision. In whatever stage the carbuncle may be, this surgeon takes a stick of potassa fusa, and rubs it freely into the centre until an eschar is fully formed. The diameter of the skin destroyed is about one-fourth or one-third of the indurated mass. A strong solution of iodine in collodion (F. 205) is then applied to the circumference of the swelling, so as to destroy the erysipelatous element of the disease. Poultices are avoided; a dressing of turpentine ointment (Brit. Phar.) being applied. Great care is afterwards taken to let the slough come away without dragging or cutting it; while attention is paid to insure cleanliness. To prevent the pain of this proceeding, Dr. Arnott's freezing mixture of pounded ice and salt can be applied to the surface for five minutes before its adoption; or the more recent plan of producing local anæsthesia by the ether spray, as recommended by Dr. Richardson, deserves a trial.

As regards the general remedies, our treatment resolves itself into insuring free excretion by the kidneys and liver and intestinal glands, while supporting the strength. Podophyllin (F. 160), nitric acid and taraxacum and senna (F. 147), purified ox bile and jalap or colocynth (F. 170), or the citrate of magnesia (F. 169), or the sulphate of manganese with colchicum (F. 172), are very useful in the first stage; but care must be taken not to induce diarrhœa. Then, chlorate of potash and tincture of perchloride of iron (F. 402), or the mineral acids and bark (F. 376), or ammonia and bark (F. 371), or quinine (F. 379), or steel and arsenic (F. 381), will prove very beneficial. Once or twice I have likewise ordered some preparation of oxygen (F. 370), and it has seemed with advantage. Such remedies, together with easily-digested food (cream, milk, raw eggs, essence of beef, mutton chops, &c.), and stimulants in accordance with the necessity for them, will probably lead the case to a successful issue. It is often neces-

sary to relieve the pain with opium; a full dose (F. 314, 317, 340) once in the twenty-four hours being better than oft-repeated small quantities.

4. MALIGNANT VESICLE.—This contagious and fatal disease (*Malignant Pustule, Charbon*) has long been familiarly known to practitioners abroad, but in this country it has attracted less attention. Examples of it, however, have occasionally been described in the medical journals. Thus, in September, 1852, Mr. Harvey Ludlow gave an account in the *Medical Times and Gazette*, of six cases which had been under treatment in St. Bartholomew's Hospital. More recently Dr. William Budd has written some excellent papers on the subject.*

Symptoms.—In most instances there is the following train of events: At first, the formation of a small pimple or vesicle on some exposed part—often the upper lip, or other portion of the face. In scratching to relieve the unbearable itching or stinging sensation, the vesicle gets broken; and then, at the end of twenty-four or thirty-six hours, there is found considerable swelling, with some discoloration. The carbuncular inflammation now rapidly increases in severity; while the tissues in the neighborhood of the original pimple swell enormously, become of a brawny hardness, get cold and lose their vitality, and assume a black color. There is a constant drivelling of saliva, the breath gets peculiarly fetid, the pulse becomes feeble and rapid, the respiration seems embarrassed, profuse clammy sweats cover the body, and delirium with great prostration sets in, death often resulting, with all the symptoms of general blood-poisoning, within eight days from the commencement of the attack.

Pathology.—This disease has been the cause of great mortality amongst sheep, oxen, horses, and other animals; being known under the names of "joint-murrain," "black quarter," "quarter evil," "charbon," "sang," "spleen gangrene," &c. It is conveyed to man either by direct inoculation, or by eating the flesh of cattle which have suffered from it; while, in some instances, flies or other insects have carried the poison from the diseased beast and inoculated him. Many facts also prove that the virus is retained in the hair, hides, hoofs, fat, and tallow of animals killed by it. Although the vesicle, in man, is usually situated on a surface habitually exposed, it is not necessarily so. Mr. Robert Harper has reported a case where it was on the penis; the patient, after dressing diseased sheep, having held this organ during micturition without previously washing the hands. For inoculation to take place, it is probably necessary that there should be some abrasion or slight wound; though it is by no means certain that it may not occur without this, in parts where the skin is thin. Women rarely suffer from malignant vesicle; most of the victims having been adult men, who had previously appeared healthy.

Treatment.—It is generally agreed that a cure can often be effected by decided treatment at an early period of the disease. One or more incisions should be made through the affected tissue, and a strong caustic applied, such as potassa fusa, or the acid solution of nitrate of mercury, or the actual cautery. Afterwards the part had better be dressed carefully with a lotion of carbolic acid. As regards the constitutional remedies, I would recommend the most reliance to be placed on full doses of quinine and steel with some mineral acid (F. 380), or on steel and chlorate of potash (F. 402), or on the sulphite of soda or magnesia (F. 48). At the same time it will be necessary to allow alcoholic stimulants, milk or cream, raw

* On the Occurrence of Malignant Pustule in England. Reprinted from the British Medical Journal. London, 1863.

eggs, and essence of beef (F. 2, 3), &c. The patient's bed must be placed where there is a free current of fresh air, regardless of the nurse's fear that he will catch cold.

VII. HEMORRHAGE.

1. **INTRODUCTION.**—The escape of blood from the vessels in which it is naturally contained constitutes hemorrhage [*Hemorrhagia*, from *Αἷμα* = blood + *ῥήγνυμι* = to break out]. There is extravasation of all the component parts of the blood, not merely an exudation of one or more of its constituents impregnated by the coloring matter—hæmatin. For several years it has been maintained that blood may exude (as sweat does from the skin) through the unbroken surfaces of organs, without any rupture in the coats of arteries, capillaries, or veins; and in this way most of the cases of hemorrhage which come under the notice of the physician have been accounted for. Dr. Todd first taught me to doubt the occurrence of hemorrhage by *exhalation;* for he argued, that if the blood-corpuscles (which measure about $\frac{1}{3500}$ of an inch in diameter) could pass through pores in the capillaries, such openings must be large enough to be detected by the microscope. More recently, Virchow has insisted upon the fact of the vascular system being everywhere closed by membranes, in which it is not possible to discern any porosity; and hence he asserts, that although we cannot, in every individual case, point out the exact site of the rupture, yet it is quite inconceivable that the blood with its corpuscles should be able to pass through the vessel's walls in any other way than through a hole in them. And yet, in spite of all this, it seems highly probable from the microscopical observations of Dr. Cöhnheim that we are wrong. By placing frogs under the influence of woorali poison, and then tying the femoral vein, this gentleman has been able to trace the phenomena of capillary congestion and ecchymosis in the transparent web of the frog's foot. In this way he has seen, as others have done by adopting his proceedings, the red blood corpuscles making their way through the apparently unbroken walls of the capillaries into the adjoining tissues. Dr. Charlton Bastian, who gave an account of Cöhnheim's observations to the members of the Pathological Society in April, 1868, describes the process as one of adherence of the corpuscles to the capillary wall; this being succeeded by the protrusion of a minute tag of the corpuscle through the wall, and this again by a larger and larger portion until the whole has escaped. In the year 1846, Dr. Augustus Waller, in describing the appearances presented on a microscopic examination of the tongue of the living frog, notices the passage of the corpuscles through the coats of the vessels. He, however, seems to have taken it for granted that there was a rupture. His words are: "I consider therefore as established,—1st, the passage of these corpuscles *de toute pièce* through the capillaries; 2dly, the restorative powers in the blood, which immediately closes the aperture thus formed."*

Many *classifications* of hemorrhage have been attempted. The chief subdivisions made by authors in the present day are these: (1.) *Traumatic*, when a vessel has been directly divided, and *spontaneous*, when the bleeding has resulted from some constitutional cause. (2.) *Symptomatic*, when clearly

* The London, Edinburgh, and Dublin Philosophical Magazine and Journal of Science. Vol. xxix, p. 287. London, July to December, 1846.

a result of some disease, as tubercle, cancer, &c., *idiopathic* or *essential*, when no such connection has been perceptible. Or (3.) *Active* hemorrhage, when congestion or inflammation has preceded the flow, and *passive*, where there have previously existed signs of debility, with poverty of blood. Moreover, hemorrhages have been termed *constitutional*, where they occur at intervals, and seem to be of service to the general health, as in the bleeding from piles in plethoric people: they are often called *vicarious*, when supplemental of some other hemorrhage, as where a woman has a periodical bleeding from the nose in place of the usual caatmenial discharge; and they are sometimes spoken of as *critical*, when the flow of blood occurs during the progress of some disease, producing marked good or bad effects.

The *causes* of hemorrhage are heat, violent mental emotions, muscular exertion, the use of stimulants, and exposure to various irritants. A predisposition to it appears sometimes as if it were hereditary, and then there is said to be the hemorrhagic diathesis. Mechanical obstacles to the circulation are powerful causes of blood extravasation. This is a fact which is exemplified in the case of valvular disease of the heart; in hypertrophy of the left ventricle of the heart, with some impediment to the passage of blood through distant capillaries; as well as in those affections of the liver which—by obstructing the flow of blood through the inferior vena cava and the vena portæ—produce congestion of the whole portal system, and as a consequence hemorrhage into the stomach or bowels. Morbid states of the blood—as, on the one hand plethora, on the other anæmia—are also favorable to hemorrhage. Degeneration of the tissues forming the coats of vessels is a frequent cause. And lastly, diseases of certain organs—as of the kidneys and liver and spleen—also tend to produce the hemorrhagic temperament, by exercising some deleterious influence upon the composition of the blood.

The *seat* of the hemorrhage, speaking with a permissible degree of latitude, may be said to vary with the patient's age. Thus, bleeding from the nose is most common in youth; from the lungs and bronchial tubes, the stomach, the urinary passages, and the uterus, in adults; and from the cerebral vessels and rectum in advanced life—between the age of sixty and seventy.

The *symptoms* necessarily depend upon the cause and seat and extent of the loss, as well as upon the condition of the patient. Where signs of plethora have previously existed, with headache, heat of skin, and a full bounding pulse, a moderate hemorrhage may prove at the time beneficial; whereas, in cases of asthenia, every ounce of blood that comes away serves but to increase the vital depression. The effects which should raise the practitioner's fears are, depression with rapidity of the pulse, pallor of the face, deep sighing, and loss of vision; coldness of the extremities; syncope on attempting to sit up; great restlessness; and wandering or delirium. Sometimes there is no loss of consciousness, even though the powers of life are almost exhausted; and then amongst the many unmistakable symptoms of approaching death, I know of none more alarming than the patient's feeble expression of perfect ease and contentment, and his desire to be let alone.

Concerning the *hemorrhagic diathesis* (in which there is probably a watery condition of the blood, a deficiency of fibrin, and a delicate condition of the coats of the vessels, but particularly of the capillaries) it will be sufficient to say that it is equally manifested in male and female children; though during adult life men seem to suffer from it more frequently than women. This habitude may be hereditary; or it can be induced by insufficient food, with residence in a close and damp situation. From time

to time I meet with or read of cases where this state appears to me to be connected with an unnatural condition of the spleen, seen either in the form of disease, or of some congenital malformation or malposition. The diathesis is indicated by the existence of a tendency to ecchymoses from slight pressure, to dropsy, to painful swellings around the joints, &c.; as well as by the occurrence of spontaneous hemorrhage from the umbilicus a few days after birth, from the nose or gums in youth, and from the urinary passages or rectum in after years. At all ages too, there is a fear lest death should happen from the failure to check bleeding after the infliction of the most trifling wound; as from a leech-bite, biting the tongue, the extraction of a tooth, a laceration from a fall, or even rupture of the hymen.

The *prognosis* is unfavorable in cases of hemorrhage where the blood escapes into a serous cavity, or into the substance of an organ, or when there is the hemorrhagic diathesis. In other instances it is generally favorable, death very rarely resulting. The obstetric physician especially, cannot but frequently feel surprised at the large quantity of blood which is lost without the patient succumbing.

With regard to the general principles of *treatment* it must be first noticed, that as a rule it is desirable to suppress the hemorrhage. Some authorities affirm that there is danger in stopping a discharge which may almost be called habitual; but I have seen nothing to lead me to acquiesce in this opinion. On the contrary, I regard it as a fallacy. In the course of years, many elderly people have come under my notice who have been injured, and greatly inconvenienced, by the frequent bleeding arising from piles. Of course, however, when such cases are interfered with, it is necessary to guard against congestions of internal organs; which may be best done by attention to the diet, and by taking care that the bowels act regularly. The few exceptional instances where attempts to arrest a bleeding would be hazardous, are found in plethoric people, who seem occasionally to be relieved from a threatened fit of apoplexy by a timely attack of epistaxis. With so-called vicarious hemorrhages the attempt is to be made to procure the flow from the natural seat.

In endeavoring to control any form of hemorrhage we ought to keep the patient as quiet, mentally and bodily, as possible. His aparment should be cool; he must rest on a mattress without much covering; his diet ought to be simple but nutritious, cold or even iced drinks being freely allowed; while the position of his body is to be such, that the afflux of blood to the bleeding organ will be impeded.

Our chief resources are then to be found in the use of astringents. One of the best of these agents is *cold;* and therefore ice is to be applied locally, while it can also be freely swallowed. A valuable and most efficient drug, is *gallic acid;* given in doses of ten to twenty grains every two or four or six hours. The efficacy of this astringent is often increased by combining it with fifteen or twenty minims of the *aromatic sulphuric acid.* The *ammonio-sulphate of iron* (ammonia iron-alum) is an excellent styptic, from which I have seen the best effects in hæmoptysis; while in all cases I think it is more to be relied on than the tincture of perchloride of iron to prevent any return of the bleeding. The *mineral acids* quicken coagulation, and hence either of them (especially the sulphuric) may often be used with advantage. *Alum* and *sulphuric acid* have answered well in several instances. *Ipecacuanha* appears sometimes to exercise a favorable influence on internal hemorrhages, but it must generally be given in doses of one grain every thirty or sixty minutes until a feeling of nausea is produced. In cases of hemorrhage from the lungs or stomach, the act of vomiting

would probably do harm; though I have often seen it work marked good in flooding after labor. The *acetate of lead* was long recommended as an efficacious styptic, but I now never use it until after gallic acid has had a fair trial. This latter failing, acetate of lead in five-grain doses, administered at short intervals with a draught of vinegar and water, has appeared useful (F. 117). I have no faith whatever in this salt when given in the ordinary small doses. *Ergot of rye* is particularly indicated in many forms of uterine hemorrhage; whether this occur in the form of flooding after labor, or in consequence of the presence of some foreign body within the cavity of the womb. The officinal liquid extract of ergot, in doses of twenty or thirty minims, frequently repeated, can usually be trusted to. Although a decided opponent to the use of secret remedies, yet it must be allowed that *Ruspini's styptic* now and then succeeds where other remedies fail. The *oil of turpentine* has also been esteemed a good astringent, especially in bleeding from the lungs, stomach, or kidneys. Ten or twenty minims may be given in mucilage every two or three hours: while sometimes it can be beneficially used in the form of inhalation, or as a stupe (a hot and moist flannel sprinkled with the oil) to the walls of the chest or abdomen.

For obstinate cases *mercury* (Hg) is a very valuable remedy. At one time I thought the beneficial effects were not induced until salivation was effected; but further experience has led me to believe this to be an error. The officinal *liquor hydrargyri perchloridi* may be given in doses of one to two fluid drachms (gr. $\frac{1}{16}$ to gr. $\frac{1}{8}$) every three or four hours, until a good effect ensues. This metal ($HgCl_2$) is contraindicated where there is any predisposition to pulmonary or renal disease.

When the hemorrhage has been excessive and has produced dangerous exhaustion, opium proves invaluable. It not only acts as a stimulant to the heart's action, but—as suggested by Dr. W. Griffin—it probably sustains, in those who seem to be dying from loss of nervous power in the brain consequent upon the insufficient supply of blood, that natural tension of the cerebral vessels which is required. As a general rule, I prefer the extract of this drug in doses varying from one to three grains; while it is better usually to combine it with acetals.

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exhaustion and somnolency into which Innocent the Eighth had fallen, notices that a Jew doctor proposed to restore the exhausted vitality by the transfusion of the blood of a young person; "an experiment that hitherto had only been made on animals. Accordingly, the blood of the decrepit old pontiff was passed into the veins of a youth, whose blood was transferred into those of the old man. The experiment was tried three times, and at the cost of the lives of three boys, probably from air getting into their veins, but without any effect to save that of the Pope. He expired on the 25th April, 1492."* As to the precise truth of these statements nothing is known. But if they are correct, it certainly seems clear that the practice of the Jew doctor did not spread. Hence, when the operation was revived about the middle of the seventeenth century, it was regarded with enthusiasm as the grand discovery of the time. The Germans have asserted that one of their countrymen, Libavius, suggested the idea in 1606. The French have claimed it for the anatomist Denis, who is said to have tried it upon man in 1666 or 1667. While in this country it is popularly believed that the credit of proposing it is due to Dr. Richard Lower, who performed transfusion on animals at Oxford, in 1665. One point is irrefutable, that on the 23d November, 1667, several ounces of the blood of a young sheep were transfused into the veins of Arthur Coga, by Dr. Richard Lower and Edmund King; the operation being performed at Arundel House, in the presence of the Fellows of the Royal Society, and with such advantage that the man wished it repeated three or four days afterwards.† The benefit, unhappily, was not of long duration. Extravagant expectations soon led to the operation being abused. In France such disastrous results ensued, that in a short time its practice was forbidden by law, save with the approbation of the physicians of the Paris faculty. And then, as it was found that disease could not be cured nor youth renewed by injecting the blood of the young into the bodies of the aged, the operation was set aside. Thus it remained in abeyance for more than a century, until again brought forward by Blundell in 1818. As to the best mode of performing transfusion but little need be said. Fresh human blood is always employed now; though authorities vary in opinion as to whether it should be defibrinated or not. The advantages of removing the fibrin are chiefly that the danger of injecting clots is avoided, while blood so treated is said to be more highly charged with oxygen than that taken pure from the veins. In either case, the syringe employed is to be completely filled, so as to exclude even a bubble of air. Then, its nozzle being introduced into either of the patient's veins at the bend of the arm, the operator must take care to proceed very slowly; for one of the great dangers of transfusion consists in forcing in the blood too rapidly. With regard to the quantity of blood to be employed, it may be remembered that the operation should be stopped when the patient has rallied; which will generally occur when from three to twelve ounces have been injected.

2. **CEREBRAL HEMORRHAGE.**—Until recently the terms cerebral hemorrhage and apoplexy have been generally employed synonymously. It is, however, highly necessary to draw a distinction between the two. For inasmuch as apoplexy, in the proper signification of the word, may

* The History of Girolamo Savonarola and of his Times. By Pasquale Villari. Translated from the Italian by Leonard Horner, F.R.S. Vol. i, p. 144. London, 1863.

† The Philosophical Transactions of the Royal Society of London, from their commencement in 1665 to the year 1800. Abridged, with notes, &c., vol. i, p. 203. London, 1809.

occur quite independently of any extravasation of blood within the cranium, so the latter frequently takes place without giving rise to apoplectiform phenomena. When the hemorrhage proves to be considerable, the victim is indeed struck down suddenly—he has a fit of apoplexy. It sometimes happens, for example, that the effusion is very abundant; the blood first poured out into one of the corpora striata, or one of the optic thalami, passing into the lateral ventricle of the same side, filling it, and then breaking down the septum lucidum so as to flow into the opposite lateral ventricle. In such a case, the profound coma that sets in can only terminate in death at the end of an uncertain number of hours. But where clots of a more moderate size are formed in the nervous tissue, there may be no impairment whatever of the senses. The symptoms are then limited to paralysis of the side of the body opposite to that hemisphere which is the seat of mischief.

In cerebral hemorrhage the blood will be effused externally on the surface of the brain, or internally within the nervous tissue itself. With the first variety—sometimes spoken of as meningeal hemorrhage—the blood is found either between the bones of the skull and the dura mater, or in the sac of the arachnoid, or in the meshes of the pia mater. The most common cause of external hemorrhage is mechanical injury—such as blows, falls, &c. Spontaneous rupture of the coats of a vessel in one of the membranes, especially where there has been any aneurismal dilatation, may happen, however. In the cerebral hemorrhage which sometimes occurs during childhood, the blood is generally poured into the cavity of the arachnoid. The symptoms produced by meningeal hemorrhage vary according to the extent of the loss. Speaking generally, it rarely gives rise to paralysis; owing perhaps to the pressure acting uniformly upon the contents of the cranium. When only a small quantity of blood is effused, absorption may speedily take place and recovery ensue.

Hemorrhage into the substance of the brain is uncommon in the young. Yet it occurs now and then in youth, and even during childhood, where there is chronic renal disease; more especially if there be likewise some hypertrophy of the left ventricle of the heart. Aneurisms of the cerebral vessels are also met with at all periods between youth and advanced life—between the ages of 14 and 65, these being the extremes in some sixty reported cases of which I have taken note. The amount of blood extravasated in cases of cerebral hemorrhage varies from a drop or two, producing clots scarcely larger than one or more pin's heads, to several ounces. Although all portions of the brain may be the seat of the effusion, still the more vascular the part the greater must be the liability to hemorrhage. Consequently, the corpora striata and optic thalami—the superior ganglia of the cerebrum—show the greatest proclivity to this accident, while the corpus callosum and fornix are the least liable to it. The effects produced vary greatly according to the site of the extravasation; the extent to which the nerve-fibres are separated, or bruised, or torn; and the quantity of blood lost. Thus, there may be only temporary mental confusion; or insensibility, passing off after eighteen, twenty-four, or more hours; or hemiplegia, temporary or permanent; or profound coma—preceded or not by convulsions—ending fatally in a few hours.

Récamier, Trousseau, Todd, and others have taught, that when complete and absolute hemiplegia occurs suddenly, without loss of consciousness, softening of the brain ought to be diagnosed. Whenever, on the contrary, the complete loss of motor power is attended by deprivation of consciousness—whenever, especially, coma has set in suddenly, then the occurrence of hemorrhage to a considerable amount should be suspected.

Furthermore, where there is perfect loss of motor power, with merely dulness of intellect without actual insensibility, hemorrhage in connection with softening will probably be found to be the cause. As already mentioned, the paralysis in hemiplegia is on the opposite side of the body to the hemisphere of the brain which is affected. Blood is rarely poured out into both sides of the brain at the same time; though a large clot sometimes extends into one lateral ventricle, and gradually increases until it breaks into the opposite one. Then, again, it is not uncommon after death to find a clot, cavity, or cyst, or cicatrix, in each division of the brain; but in such there is almost always evidence to show that the appearances of mischief on one side are more recent than those on the other. Supposing only a small clot to be formed, it can ultimately become absorbed, merely leaving a cicatrix. The extent of motor tract which has been injured being also small, the paralyzed limbs will recover. Where this favorable result ensues, it almost always happens that the leg regains its power sooner than the arm; while what is equally inexplicable and even more remarkable, when the arm recovers first, such an event is said to be an unfavorable omen. Certainly, in a few reported cases where the patient has been able to use the arm before regaining the capability of walking, the arm has again lost all motor power at the end of a few months, severe pains have attacked the leg, and death has been preceded by complete imbecility. The pons Varolii being a part absolutely essential to life, since in it the most important nerve-fibres converge—transverse fibres between the two hemispheres of the cerebellum, and connecting this with the cerebrum, as well as longitudinal fibres linking the medulla oblongata with the cerebrum—so when blood is effused into this structure there rapidly ensues deep apoplectic stupor, paralysis of both sides of the body, and death at the end of a few hours. And then, lastly, hemorrhage into the cerebellum may take place alone, or combined with effusion into the cerebrum. Either form of extravasation in this organ is far from being common; but when it occurs it very quickly causes death.

On searching for the immediate *cause* of cerebral hemorrhage, attention must be paid to the composition of the blood, the state of the heart and kidneys, and coats of the bloodvessels, and the condition of the tissues of the body generally. With regard to the first, our knowledge is imperfect; but, according to Andral and Gavarret, there is an essential connection between cerebral hemorrhages and a diminution of the fibrin of the blood with an increase of the red globules. Rupture of a vessel not unfrequently occurs as a sequel of renal or cardiac disease, when it is probably due in part to an altered condition of the blood, though we know that in Bright's disease the coats of the arteries are also often the seat of some degeneration. Thin or poor blood may be the only cause; in confirmation of which view, it may be remarked that a fatal fit occurred in a patient under my care, who, for many months, had suffered from almost uncontrollable uterine hemorrhage, due to a fibrous tumor. Mr. Travers met with a case where the attack of hemorrhage happened while the patient was being bled for pneumonia; and numerous examples are on record of the occurrence of apoplectic stupor at the very time that bleeding was being practiced for the relief of hemiplegia. There are many circumstances which render it probable that, in the majority of cases, disease of the coats of the vessels is the cause of the effusion; more especially, if combined with such disease, there be hypertrophy of the left ventricle of the heart, forcing the blood with greater power than the coats of the vessels can stand. Of course, the chances of rupture are much increased if the morbid action in the coats of the vessels has gone so far as to give rise to aneurism. Chronic arteritis,

by producing pulpy softening, or calcareous or atheromatous deposits (calcification and fatty degeneration), may render the vessels unable to bear the force of the blood-current. When the nutrition of the nerve-tissue becomes diminished, softening ensues, and the same result sometimes follows from acute inflammation. The way in which the cerebral arteries get occasionally plugged by a portion of fibrin (an embolus) has been already described.

As regards the *treatment* of cerebral hemorrhage, I have but little to say. The patient is to be kept quiet; the sitting posture is more favorable than the horizontal. Nourishing food is to be allowed in such quantities as can be digested. Attention should be paid to the intestinal and renal excretions to this extent, that if the bowels are confined, an aperient had better be given; while, where there is retention of urine, a catheter must be employed. No benefit whatever, but, on the contrary, great mischief is likely to arise from bleeding, strong purgatives, emetics, and deprivation of nourishment.

At about the end of twenty-four or thirty-six hours from the commencement of cerebral hemorrhage, there frequently sets in a certain amount of febrile action. The face becomes flushed, the skin hot, the respiration somewhat hurried, and the pulse frequent—perhaps hard or wiry. In such cases simple remedies are still the best. A few doses of the solution of citrate of ammonia can be given, if medicine be thought desirable; but a free allowance of soda or potash water, iced water, tea with milk, &c., will prove quite as serviceable.

3. OTORRHAGIA.—Hemorrhage from the ears [*otorrhagia*, from *Οὖς* = the ear + *ῥήγνυμι* = to burst out] arises from several different causes. The chief are the following: 1. *Fracture of the base of the skull*, by which a communication is established between the sinuses of the dura mater and the middle ear. The membrana tympani being ruptured, the blood escapes externally. If both petrous bones be injured, there will be hemorrhage from both ears. The occurrence of bleeding, on one or both sides, is generally regarded as a symptom of very unfavorable import. 2. *Wounds and ulcerations of the auditory canal;* whether produced by earpicks or other instruments, insects, foreign bodies voluntarily introduced, or old hardened ceruminous concretions. 3. *Granulations, polypi, and abscesses of the auditory canal.* The proper use of the ear speculum will show which of these conditions is actually present. 4. *Caries and necrosis of the petrous portion of the temporal bone, with destruction of the membrana tympani.* If the walls of the carotid canal be involved, a spiculum of bone may wound the internal carotid artery and cause fatal loss of blood. 5. *Rupture of the membrana tympani;* which can occur during the ascent of high mountains, or in the descent of low valleys, or in going to any great depth in a diving-bell, &c.; during violent sneezing or vomiting, or during a paroxysm of hooping-cough or asthma. In these cases the air is violently forced through the Eustachian tube into the tympanum, the delicate membrane of which gives way where it is least capable of offering resistance, near the insertion of the handle of the malleus. And 6, otorrhagia will perhaps be *a vicarious hemorrhage, i. e.*, it is said that this form of hemorrhage may replace the catamenia, or a long-continued bleeding from piles or old ulcers, though, as far as my own experience goes, I have never known of such an occurrence.

4. EPISTAXIS.—Probably every one remembers the frequency with which, in his school-days, he suffered from a "bloody nose," and the

famous plans by which old ladies were wont to cure it. Unless this bleeding comes on during the progress of some disease—as hooping-cough, continued fever, anæmia, &c., it is seldom at all troublesome in youth.

But epistaxis [*Ἐπιστάζω* = to drop upon] should generally give rise to much anxiety when it occurs in advanced life. If there be a tendency to apoplexy, or if the patient be afflicted with heart disease, the bleeding is not unlikely to prove beneficial for a time. Even then it is an occurrence of serious import; for it may indicate disease in the coats of the bloodvessels at different parts of the body, and possibly prove to be the first threatening of a more serious attack of hemorrhage into some internal organ. Moreover, no advantage whatever is gained by a bleeding from the nose when this sets in during the progress of disorders which injure the quality of the blood; as in renal and hepatic and splenic diseases, in fever, in scurvy and purpura, &c. Exhausting epistaxis will sometimes prove the immediate cause of death in cases of leucocythemia, when this affection is approaching a fatal termination.

The bleeding seldom takes place simultaneously from both nostrils. It is either a transitory occurrence, or it is continuous, or it ceases and returns after an uncertain interval, or it happens periodically. The blood flows in drops, or in a complete stream; while it not only comes from the nostrils in front, but may pass posteriorly into the mouth and fauces. As regards adults, males suffer from it more often than females. It can be caused by direct violence, by whatever obstructs or greatly quickens the circulation, by morbid states of the blood, by congestion of neighboring parts, by the suppression of some habitual discharge, by an ulcer on or through the septum of the nose, by exfoliation of the bones assisting to form the walls of the nostrils, as well as by polypus and disease of the pituitary membrane.

As to the *treatment*, care must be taken to discriminate between those cases where interference is requisite, and the contrary. Supposing the aid of the practitioner is needed, it will be better to have the patient sitting upright in a cool apartment, and with the neck unconfined by collars, &c. Dr. Négrier says he has always found the bleeding arrested by making the patient raise one or both of the arms above his head, and letting him hold them in that position for some time. This simple plan failing (for, like all infallible remedies, it seldom answers), cold applied to the neck and back may, by reflex action, check the discharge; or cold water, or ice, can be applied directly over the nose and forehead. External compression of the nostril with the fingers sometimes succeeds,—usually by favoring the formation of a clot. In urgent cases I have successfully swabbed the nostril with a saturated solution of perchloride of iron; and have likewise seen injections of infusion of matico, or of alum and water, or of the tincture of perchloride of iron and water, or of the iron-alum in solution, do good. Plugging the nostril with charpie, or with cotton-wool soaked in some astringent lotion, often stops the flow; and so does the passage of a styptic rod made with equal parts of tannin and cacao butter (F. 424), or the employment of tannin mixed with a little alum as snuff. But these expedients proving useless, the posterior orifice of the nostril must be plugged; a proceeding, however, which is very annoying to the patient. It is easily accomplished by introducing a gum-elastic catheter, with a piece of waxed twine passed through its canal so as to project at the eyelet-hole, along the nostril into the pharynx; the end of the ligature being then brought through the mouth by means of a pair of forceps, and made tight to a piece of sponge. By removing the catheter, and pulling the nasal end of the twine, the sponge plug will be firmly drawn into the posterior nares; from which position it should not be removed for forty-eight hours.

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4. EPISTAXIS.—Probably every one[illegible] this form of hemorrhage,
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reason to suspect tuberculosis. When there exists a predisposition to hæmoptysis, it can often be immediately brought about by anything which hurries the circulation, by congestions of various important organs, by violent coughing, playing on wind instruments, ascending high mountains, tight lacing, &c.

The discharge, when proceeding from the lungs, is often preceded by pain or oppression about the chest, a sense of heat and soreness beneath the sternum or between the shoulders, lassitude and mental depression, flushings of the face, a salt taste in the mouth, dry cough, and more or less dyspnœa with palpitations. On other occasions I have noticed that there has been a complete absence of premonitory symptoms, with the exception of an infrequent and perhaps laboring pulse. The quantity of blood which will be expelled varies from a streak on a pellet of mucus, or a minute clot or two, to one or many pints. As it comes up, if in any appreciable quantity, it is generally frothy and of a bright florid hue. It is usually expectorated with a variable amount of coughing; though when the bleeding is excessive, the blood is often gulped up or vomited. Occasionally, the diagnosis can be aided by shaking out the clots in water; when they will perhaps be found distinctly branched, and forming casts of the bronchial tubes. Hæmoptysis occurs in about two-thirds of all the cases of phthisis, and it does so under two circumstances. Thus, it may happen from the active congestion of the first stage of tubercular deposit causing rupture of one or more small vessels, when it is to be regarded more as a warning of coming mischief, rather than as a proof of the lung being irremediably injured; or it can take place when the tubercles have begun to soften, and the coats of some vessel have been destroyed by the spreading of the ulceration. The hemorrhage very rarely destroys the patient at once; though in the cases which I have watched, it has frequently seemed to hasten the fatal termination of phthisis.

Half a dozen exceptional cases of tubercular phthisis are known, where the hemorrhage has had its origin in a rupture of an aneurism of one of the branches of the pulmonary artery. Sometimes, the aneurismal tumor has been developed, as it were, in a tubercular cavity; the sac of the aneurism probably filling the vomica completely prior to rupture. In other instances, a varicose dilatation of the vessel has been found, perhaps extending for a couple of inches. On rupture of these aneurisms death may of course happen immediately; but in the cases which have been reported there have usually been occasional attacks of severe hemorrhage for a few weeks before the patient has succumbed from exhaustion.

In dilatation of the bronchi, without any coexisting tubercular disease, small quantities of blood are often expectorated with the sputa. But every now and then it happens, in these cases, that the hemorrhage is abundant; and I believe a few instances have happened where such hæmoptysis has proved fatal.

Many examples of aortic aneurism have been reported where there has been rust-colored expectoration; or where the sputa have been tinged with bright blood; or where there have been one or more gushes of blood for weeks or even months before the disease has proved fatal by complete rupture, or by inducing laryngeal suffocation from pressure of the sac on one or both recurrent nerves. In the well-known case of Mr. Liston, hæmoptysis to the extent of several ounces occurred in July, 1847; after which there was a freedom from almost all symptoms until October, when cough set in with rusty sputa. Death took place in the December of the same year. At the autopsy, there were found three or four perforations of the trachea,

communicating with the sac of the aneurism, the openings having become blocked up with portions of the clot.

In *pulmonary apoplexy* (an absurd name, for there is no sudden stroke, no loss of sensation or power of motion) the blood is effused into the air-cells, and occasionally into the smaller bronchial tubes, where it coagulates. There are two forms of this affection,—one where the effusion is *circumscribed*, and we find small and hard masses in the substance of the lungs, varying in size from a pea to a small orange; the other, in which the blood is *diffused* through the broken-down pulmonary tissues. Extravasation of blood into the air-cells of the lungs most frequently arises from disease of the heart, particularly of the mitral orifice; but it may possibly be due to some affection of the pulmonary tissue or vessels, or to such an impoverished state of the blood as occurs in scurvy, fever, &c. Whether the blood come from ruptured bronchial arteries, or from the plexuses formed by the pulmonary capillaries on the septa of the air-cells, is undecided: most probably it is sometimes from one source, sometimes from the other. Occasionally, the internal bleeding is attended with spitting of blood. If only a small quantity be extravasated, the patient recovers; but if the loss be excessive, symptoms of internal hemorrhage with great dyspnœa will manifest themselves, and most probably end fatally. Auscultation often tells us nothing in these cases. Nevertheless, if we can fortunately listen before the blood coagulates, we, perhaps, shall find large crepitation from the air-bubbles passing through the fluid and bursting; while subsequently there will be dulness on percussion, with absence of all respiratory murmur in the affected portion.

A few special remarks are called for on the *treatment* of hæmoptysis. The hemorrhage should always be checked as quickly as possible; and for this purpose, after enjoining strict quiet and rest in bed, with the head and shoulders elevated, I have found no remedy so efficacious as gallic acid. This agent should be given in the proportion of ten or fifteen grains, every two, or three, or four hours, according to the urgency of the symptoms; sometimes commencing with thirty grains for a dose in five or six ounces of water, with half a drachm of the aromatic sulphuric acid. When there are indications of great anæmia, from five to ten grains of the ammonio-sulphate of iron (F. 116) may be preferable to the gallic acid. Sucking small pieces of ice does great good; and occasionally the application of cold over the chest is useful, though the effect of this practice must be watched. In one instance, where frightful quantities of blood were being brought up, the violence of the discharge could only be checked by pouring cans of cold water over the chest. Certain authorities state that a teaspoonful of common salt, dissolved in a little water, or taken dry and swallowed as best the patient can, seldom fails to stop the bleeding for a time; others advise bleeding, leeching, antimony, or digitalis; some prefer the ergot of rye, or turpentine, or emetics of ipecacuanha; many, again, recommend dry cupping over the chest, or the application of turpentine stupes; while a few speak highly of the use of a ligature round the limbs, so as to impede the return of blood through the veins.

The patient is not to be reduced by low diet. Strong essence of beef, milk or cream, cold tea, and raw eggs are to be allowed; while there is not the least objection to solid animal food, &c., if there be any desire or appetite for it. And although many cases will do well without stimulants, yet there are others where alcohol, in some form or other, is really needed. Good claret, or carlowitz, or ofner, or tokay, or port wine, in proper quantities, at proper intervals, will often prove useful. For it must be recollected, that not only is it necessary to stop the hemorrhage, but our remedies have

to be so ordered as not to encourage the extension of the disease which has set it going.

To prevent the recurrence of the bleeding in diseases of the air-passages or lungs, I have some confidence in the inhalation of atomized astringent fluids. Tannic acid (F. 262) has especially seemed serviceable when thus employed. It will also be necessary to relieve any cough which may be present by anodynes—especially by morphia (F. 346, 347). Meanwhile, every endeavor ought to be made to improve the general health. If change of air be thought advisable, care should be taken to select a fitting locality. To send an individual just recovering from hæmoptysis, perhaps due to a slight deposit of tubercle, to a mild relaxing watering-place, is simply to invite the hemorrhage to return. A dry and bracing climate, or a long sea-voyage, in a large and well-appointed ship, may prove very serviceable; whereas, a residence in a warm and humid atmosphere can only be productive of most mischievous results.

7. **HÆMATEMESIS.**—This term, signifying, strictly, vomiting of blood [Αἷμα = blood + ἐμέω = to vomit], is generally employed to denote hemorrhage from the stomach. The blood is usually vomited in large quantities, is not frothy, is sometimes mixed with food, and is often of a dark color from admixture with the hydrochloric acid of the gastric juice (all acids blacken the blood). Hence, it presents marked differences from the blood in hæmoptysis; which is brought up by coughing in mouthfuls at a time, is of a florid red color, is frothy, and is frequently mixed with sputa. Moreover, in hæmoptysis the hemorrhage is generally preceded by cough, dyspnœa with palpitation, tickling in the throat, and a peculiar sensation in the thorax.

To make the distinction more clear, the chief signs of each variety may be thus tabulated:

In hæmoptysis:	*In hæmatemesis:*
Dyspnœa; pain or heat in chest.	Nausea; epigastric tension.
Blood coughed up in mouthfuls.	Blood vomited profusely.
Blood frothy.	Blood not frothy.
Blood of a florid red color.	Blood dark-colored.
Blood mingled with sputa.	Blood mixed with food.
Absence of melæna.	Melæna very common.
Bronchial or pulmonary symptoms.	Gastric or duodenal symptoms.

Hæmatemesis occurs every now and then without any appreciable cause; or perhaps it happens to be vicarious of some other hemorrhage, especially of the catamenia; or it results from changes in the blood itself, as in scurvy; or it arises from aneurism of one of the abdominal vessels, the sac communicating with the bowels;* or it may be owing to congestion of the stomach from some impediment to the free passage of the blood, such im-

* Dr. Gairdner has recorded (Clinical Medicine, p. 495, Edinburgh, 1862), an instructive example of aneurism of the superior mesenteric artery; which opened in the duodenum twenty-two months before death, causing repeated and very copious hæmatemesis. The symptoms and history closely resembled those of gastric ulcer. And there was this remarkable circumstance, that between the patient's admission (she was a servant-girl, sixteen years old) into the Edinburgh Royal Infirmary on the 4th January, 1848, and her death on 28th November, 1849, complete convalescence took place. This was somewhat interrupted by an ulcer on the leg, amenorrhœa, and dyspepsia; but the hæmatemesis did not recur after the 7th February, 1848. On the day of her death she fell down suddenly in the street, with an attack of syncope. At the autopsy it was found that the aneurism had burst into the peritoneum, in the cavity of which more than 3 lbs. of blood had been extravasated. The duodenal opening was closed.

pediment being due to disease of the heart, liver, &c. Thrombosis of the portal vein (arising either from disease of the coats of the vessel, or from obstruction of its canal by the compression of cancer, or cirrhosis, or abscess) has, on more than one occasion, proved to be the cause of fatal hæmatemesis. But the most direct provocative of this form of hemorrhage is either passive congestion of the walls of the stomach, or simple or malignant ulceration. In simple ulceration, the blood most frequently comes away slowly, in small quantities, and often after a meal; though sometimes a large vessel is laid open, and a gush of blood takes place, which possibly proves fatal. So also in the ulceration of a cancerous mass, the bleeding is usually slight. When, from any causes, the extravasation is moderate, the vomited matters are said to resemble "coffee-grounds."

Hæmatemesis is more common in women than in men. It is generally preceded by a feeling of oppression and weight, by dull pain or tenderness in the epigastric and hypochondriac regions; as well as by a sense of anxiety and faintness. Often there is only nausea, dizziness, and lowering of the pulse in frequency and force. The hemorrhage commonly produces great depression; owing partly to that alarm which is always engendered by "spitting of blood," and partly to the quantity of blood lost.

In gastric hemorrhage, the blood frequently passes into the intestines, and is voided per anum; or part will be vomited, and part expelled by the fæces. When the intestinal evacuations contain blood, whether this comes from the vessels of the stomach, or only from those of the intestines, the patient is said to be suffering from *melæna* [*Μέλας* = black]. As this name implies, the evacuations are often black, and sometimes resemble tar; but the dark appearance is by no means constant, and does not occur if the blood comes away too quickly to be acted upon by the intestinal juices. Cirrhosis of the liver, or any disease which produces obstruction of the portal system, necessarily gives rise to congestion of the gastric and intestinal veins; a condition which often terminates in the extravasation of large quantities of blood that are expelled with the stools. Amongst the other less common causes of malæna may be mentioned enteritis, dysentery, intussusception, simple and carcinomatous ulcerations, aneurismal and other tumors, &c. It must not be confounded with bleeding from the rectum, owing to the presence of a polypus, or of hæmorrhoids.

The treatment of acute hæmatemesis should consist in enjoining abstinence from solid food, with perfect rest in the horizontal posture; while cold acidulous drinks, ice, strong essence of beef, and perhaps some astringent Hungarian, or Greek, or Bordeaux wine may also be prescribed. If the patient be prostrated, enemata of beef tea, with port wine or brandy and a little opium, will do much good. With respect to drugs, a mixture of gallic acid with the aromatic sulphuric acid (F. 103) will often answer well. The oil of turpentine is thought by some to be a specific (F. 102). In one case, a single dose of a concentrated solution of the perchloride of iron (one teaspoonful in glycerin) effected a cure. Prolonged application of cold to the epigastrium is occasionally useful.

Where the bleeding is chronic, or when it is continuous but slight in amount, the mineral acids with bark (F. 376) will often do more real service than any other remedies. Quinine and iron, however, prove very valuable in some instances (F. 380). Cream, raw eggs, essence of beef, various broths, and perhaps cod-liver oil, ought also to be allowed. As regards cases of melæna where there is no gastric disease, active purging will be necessary; and hence a full dose of calomel and jalap, or of podophyllin (F. 140, 160), should be given, followed by the common black

draught or castor oil. Subsequently the mineral acids with bitters (F. 378) may be tried.

8. HÆMATURIA.—Hæmaturia [from *Αἷμα* = blood + *οὖρον* = urine], or hemorrhage from the mucous membrane of the urinary passages, may proceed from the kidneys, or bladder, or urethra. It is common in the early stages of those forms of renal disease which have their origin in a morbid state of the blood: hence, as we shall see by and by, it is a frequent result of acute desquamative nephritis. It may also arise from malignant disease of the kidney or bladder; from the presence of a calculus either in the kidney, ureter, bladder, or urethra; from cystitis; or from renal inflammation, as well as from granular degeneration. A blow over the loins has caused it; while irritating medicines, such as oil of turpentine and cantharides, can also produce it. Occasionally it sets in during the course of rheumatic fever, pneumonia, continued fever, malignant small-pox, scurvy, &c., just as epistaxis does. Having more than once seen urine contaminated with the menstrual discharge mistaken for real hæmaturia, it will hardly be deemed superfluous to give a word of caution. As a rule, therefore, in any case of suspected renal disease occurring in woman, the practitioner should not venture on stating a positive opinion while the patient has her courses on.

Urine containing blood in comparatively small quantity will be found of a peculiar smoky hue, or even of a black color (owing to the action of the acid of the urine on the hæmatin), and loaded with albumen. If the escape of blood be free, the color may vary from a port-wine hue to a bright arterial tint. The *distinction between renal and vesical hemorrhage* is important. Dr. Prout states that when the "blood is derived from the *kidney*, it is in general equally diffused throughout the whole urine; on the contrary, when derived from the *bladder*, the blood for the most part comes away in greater or less quantity at the termination of the discharge, the urine having previously flowed off nearly pure." Sir Thomas Watson has also remarked that the expulsion of slender, cylindrical pieces of fibrin, which have evidently been moulded in the ureter, is characteristic of hemorrhage from the kidney or commencement of the ureter. Moreover, in hemorrhage from the secreting portion of the kidney (not the pelvis), the urine on being examined microscopically is usually found to contain casts of the renal tubes formed of coagulated blood (often spoken of as *blood-casts*); while there is also seen the delicate round renal epithelium, with casts composed of epithelial cells and blood-corpuscles. When the bleeding is from the bladder, the blood-corpuscles are observed mixed with the flat scaly vesical epithelium; and the urine contains also more or less muco-purulent matter. Supposing malignant disease to be the cause, cancer-cells will not unfrequently be found in the urine, and so determine the diagnosis. If there be one or more calculi, the hemorrhage will be lessened or entirely checked by rest, and increased or reproduced by any jolting exercise. While where the blood comes away in drops or in a stream, unmixed with urine, the urethra is in all probability its source.

During the last year or two, the histories of a few cases of *intermittent* or *paroxysmal* hæmaturia have been recorded in the medical journals. Though of rare occurrence, this disorder did not escape the observation of Rayer, of Elliotson, &c. The pathology of it is involved in doubt. The precise cause of it is unknown. Sometimes this affection is apparently connected with marsh miasma, the blood appearing at regular intervals, and perhaps being accompanied by imperfect rigors. This form

can often be cured by full doses of quinine or arsenic. In other instances, it seems to have had its origin in simple exposure to cold; and in these the usual remedies for malarial poisoning are valueless. The urine is quite healthy, except at the time of the attack. Then it is found of a deep brownish-red color; it contains an excess of urates and mucus; a variable (as regards quantity) precipitate of albumen is thrown down by heat or nitric acid; while no blood-corpuscles can be seen on a microscopic examination, but only disorganized blood constituents and possibly tube-casts of disintegrated blood. The blood elements seem to come from the kidneys; and possibly as an exudation from the Malpighian bodies. The absence of blood-corpuscles looks like an indication that there has not been a rupture of any vessel.*

A peculiar form of hæmaturia is sometimes met with in Egypt, Southern Africa, and the Mauritius, which is probably due to the Distoma hæmatobium. The eggs of this parasite are to be found in the urine, and sometimes the perfect entozoon may be discovered. The parasite is probably introduced into the system by drinking the waters of the district without filtering them.

The *treatment* will vary with the circumstances under which the hemorrhage occurs. Where there is malignant disease, or a calculus at any part of the urinary tract, astringents should be resorted to; the best being the tincture of the perchloride of iron, gallic acid, Ruspini's styptic, the diluted sulphuric acid, &c. The fear of causing strangury must prevent the use of turpentine. Where there is some morbid poison in the blood, or actual renal disease, we ought to rest the kidneys, and promote elimination by the skin and bowels; for which purpose hot air or vapor baths, warm water baths, and purgatives, will prove the most effectual. Simple drinks, especially plain water, should be taken very copiously. Hemorrhage from the urethra will often be checked by the application of ice; or by passing a large bougie, and leaving it in the passage for some hours. Lastly, in vesical hemorrhage, a solution of alum or of tannic acid, of such a strength as to have a styptic taste, may be injected into the bladder; while the iron-alum can often be advantageously administered at the same time.

9. UTERINE HEMORRHAGE.—Hemorrhage from the uterus is a symptom of so many different diseases, that, to consider it properly, one ought to write a treatise on the various functional and organic derangements of this organ. Two forms of uterine hemorrhage have to be distinguished, viz., menorrhagia and metrorrhagia. The term *menorrhagia* [Μῆνες = the menses + ῥήγνυμι = to burst out], should only be applied to cases of increased menstrual flow; although it is very often employed to

* Among a few other examples of paroxysmal hæmaturia which have fallen under my notice is the following. It may be mentioned here, as I have not met with anything of the kind in previous cases of abdominal section. Briefly, the facts are these: On the 25th February, 1868, I removed two ovarian tumors from a young lady, 19 years of age. The urine had been previously examined, and found to be quite natural. After the operation, the catheter was employed for several days. On the 26th the urine withdrawn appeared clear and healthy. There was sickness during the day and night; but no shivering—not even chilliness. On the 27th, at 10 A.M., Dr. Peplow drew off more than half a pint of very bloody urine. At 3 P.M. I emptied her bladder myself, taking away a pint of urine which was loaded with blood. On boiling, it became almost solid from coagulation of albumen. Examined microscopically, a quantity of dark granular matter was found with some nucleated epithelium; but no blood-corpuscles could be seen, nor any tube-casts. At 11.30 P. M. I again introduced the catheter. The urine was then clear and pale and acid, the specific gravity being 1012: no deposit was produced by boiling, or by adding nitric acid. There was no return of the hæmaturia subsequently.

signify any sanguineous discharge from the uterus other than the normal monthly escape. *Metrorrhagia* [*Μήτρα* = the womb + *ῥήγνυμι*] is the technical expression for hemorrhage occurring from the uterus independently of menstruation.

The *catamenia may be abnormally increased* from conditions which produce attenuated blood; as tuberculosis, granular degeneration of the kidneys, affections of the spleen, anæmia owing to prolonged lactation, &c. Another common cause is excessive congestion of the ovary and uterus during the maturation and escape of the ovule. The same result also ensues from any great excitement at the monthly period, or excessive sexual indulgence at other times; from metritis and ovaritis; from the approach of "the change of life;" from the hemorrhagic diathesis; as well as from such relaxation of the uterine tissue as is often associated with abrasion of the lips of the cervix. Moreover, where there is structural disease of the uterus—*e. g.*, fibroid tumor, polypus, or cancer—the menstrual flow frequently merges into uterine hemorrhage, and thus proves most troublesome. It is frequently very disheartening in the treatment of fibroid tumor, to find that just as the strength is being regained the monthly period comes round; the flow, by its excess, prostrating the patient, and undoing all that has been accomplished in the preceding two or three weeks.

The diseases which give rise to *uterine hemorrhage*, properly so called, are principally cancer; polypi, whether cellular, or granular, or fibrous; as well as fibrous tumors, especially such as produce enlargement of the uterine cavity, or which impede contraction of the muscular fibre cells and other structures composing the wall of the uterus. Then this condition may be occasioned by congestion of the uterus or ovaries; by inflammatory engorgement or hypertrophy of the whole uterus, or of the cervix and labia only; and by fungoid degeneration of the mucous membrane lining the uterine cavity. Among the more exceptional causes of hemorrhage we must not omit to mention pelvic hæmatocele; subinvolution, as well as chronic inversion of the uterus; and the retention in the womb of any portion of a product of conception,—such as a vesicular mole, &c. Either of the foregoing affections may produce frequent attacks of bleeding, or a constant loss. The blood comes away steadily, drop by drop, with occasional small coagula, so as to saturate three or four napkins in the twenty-four hours; or there are gushes at intervals, with large clots; or the loss at times becomes so severe as to amount to flooding. The practitioner must also remember the frequency with which copious hemorrhage proves to be the precursor of abortion; no less than the constancy with which it indicates more or less separation of the placenta—perhaps owing to placenta prævi—in the latter months of pregnancy.

On making a few remarks upon the *treatment* of these cases, it will be necessary to confine them to the steps to be adopted for controlling the hemorrhage; since the proceedings required for removing its cause will hereafter be treated of. At once, therefore, it may be said that astringents are the remedies chiefly to be trusted to; and the best of these are gallic acid and cinnamon, either alone or in combination, or with the aromatic sulphuric acid (F. 103, 104). Some authorities advise the acetate of lead: if used, it should be given in larger doses than are ordinarily employed (F. 117). Where any inflammatory action exists, mercury will be a good agent to employ; and, as before mentioned, I prefer the solution of corrosive sublimate (F. 27). The ergot of rye has no styptic property; though when the bleeding is due to a flabby state of the uterus, this drug does considerable good by inducing contraction. There is no objection to administering it in combination with astringents (F. 103). Suppos-

ing there is anæmia as a cause of the loss, the ammonio-sulphate of iron proves very efficacious (F. 116); more so, in my opinion, than the perchloride of iron. The latter, however, is sometimes serviceable (F. 101). Every now and then we meet with cases where the discharge of blood is excessive, though we can detect no cause for it, and where no kind of astringent or tonic has the least effect. In such I have found most benefit from corrosive sublimate, or some other preparation of mercury; the infusion of digitalis, in half-ounce or ounce doses, as strongly recommended by Drs. Dickinson and Robert Lee, having given me nought but disappointment.

The local remedies to be resorted to are of considerable importance. The principal are as follows: A favorite remedy is the application of cold water over the pubes. To be of any service, ice in a bladder should be employed. Napkins dipped in vinegar and water soon get converted into offensive fomentations. The frequent introduction of small lumps of ice up the vagina, or the use of enemata of very cold water, will often prove efficacious. The same remark applies to vaginal injections of tannic acid or infusion of matico; especially if the patient's hips be so raised that a portion of the fluid can be retained at the top of the vagina. I have also seen great good follow the employment of astringent vaginal pessaries (F. 423); or the use of galvanism where there is a want of muscular contraction; or the introduction of sponge-tents up the canal of the cervix, and through the internal os (F. 426). These plans failing, or it seeming probable that they will fail if tried, recourse should be had to plugging the vagina firmly with some soft material like cotton-wool; or with a sponge soaked in vinegar; or with an elastic air-ball inclosed in a case of spongiopiline, which is capable of exerting considerable pressure on being distended. Plugging the os uteri only, with lint or cotton-wool, does not succeed as well as might be anticipated; for the foreign body seems to cause contraction, so that it is soon expelled into the vagina. In several instances where there has been troublesome hemorrhage from the upper part of the interior of the uterus, I have succeeded in stopping it with the styptic rod of tannin and cacao butter (F. 424). The passage of this rod into the uterine cavity is easily accomplished; while in no case has its retention and dissolution in the uterus produced any unpleasant symptoms. The patient is of course to be kept quiet in bed in all cases; the diet, &c., being such as has been advised in managing the other important varieties of hemorrhage.

VIII. INFLAMMATION.

Every part of the body is liable to inflammation [*Inflammo* = to burn], and much of the premature extinction of human life is due to it. Hence a knowledge of the various phenomena of this morbid process—their causes and relations and effects, may be said to constitute the master-key to the comprehension of the nature of a large amount of disease.

Now although inflammation is here spoken of as "a morbid process," it is not to be inferred that its effects are not frequently most salutary. By it many morbid poisons are gradually expelled from the system, wounds which do not unite by the first intention are healed, fractured bones become firmly knitted together again, and so on. A portion of skin and connective tissue, as in the case of a boil, inflames and degenerates and dies: yet the inflammatory process, by its continuance, not only leads to the casting off of the slough, but also to the reproduction of healthy tissue.

No useful or indeed correct definition of inflammation can be given at present. It may only be said that it is sometimes a destructive, sometimes a formative process: and that it consists essentially of an excessive proliferation of cells, accompanied by marked symptoms of local and constitutional disturbance. In vascular structures, when inflamed, it can be seen that there is congestion and stagnation of blood, with morbid adhesiveness of the corpuscles, in the capillaries of the affected tissues; these vessels being at first contracted, but subsequently becoming dilated. There is also an exudation of liquor sanguinis through the walls of the vessels, with or without extravasation of blood-cells; the exuded matter undergoing certain important changes according to the texture in which it occurs, the coexisting local or general disease, and the severity or extent of the inflammatory process itself.

Causes.—Inflammation occasionally arises unexpectedly, and from causes unknown. In other instances it will be found to have been produced by some mechanical or chemical irritant; or by the action of cold; or by some morbid poison received into, or generated within, the system. It is now admitted by many as probable, that inflammation is not an affection of the capillaries, nor an altered state of the nerves, nor a change in the blood; but that it is a form of abnormal nutrition—that where it has its seat, the series of changes by which the tissues should be renovated becomes deranged. It is said to be *acute* when it runs its course rapidly, and is attended with severe constitutional and local disturbance; *chronic*, when its phenomena are less strongly marked. *Subacute* inflammation is marked by symptoms which are intermediate between acute and chronic, and which do not attain any great severity. By some authors the term *latent* has been applied to those cases in which internal inflammation proceeds silently and treacherously, and without manifesting signs by which its existence might be suspected. And then there are certain *specific* inflammations, examples of which may be seen in scrofula, gout, rheumatism, syphilis, the exanthemata, &c.

Pathology.—The study of the pathology of this complex morbid process shows that it consists in a derangement of the normal nutritive changes, leading to loss of function in the elements of the tissue involved. "The conditions of the healthy maintenance of any part by nutrition, are," observes Mr. Paget, "1st, a regular and not far-distant supply of blood; 2d, a right state and composition of that blood; 3d (at least in most cases), a certain influence of the nervous force; and 4th, a natural state of the part in which nutrition is to be effected. All these are usually altered in inflammation."* The *supply of blood* to the affected texture is increased; the vessels are dilated and elongated, so that such as were previously invisible come into view, owing to their distension with red corpuscles; there is a tendency to stagnation—an agglomeration of the red corpuscles into masses so that the vessels get choked, all blood movement through them being stopped—in many of the turgid vessels; while when lymph is effused, and begins to be organized, new vessels are formed in it. Every student, in the pursuit of microscopic investigations, has watched with delight the circulation in the healthy web of the frog's foot; and doubtless must have noticed that as the blood flows through the vessels the red corpuscles are most abundant in the middle of each stream, being surrounded by liquor sanguinis. On applying a drop of any irritant to the web, however, the stream gets more loaded with the blood-cells, the clear margin of liquor sanguinis gradually disappearing; while coeval with this, the rate of move-

* Lectures on Surgical Pathology. Second Edition, p. 219, London, 1863.

ment lessens. As the work of the irritant becomes more appreciable to the tissue, these two conditions (increase of cells and diminution of circulation) become more and more manifest, and the vessels enlarge; the blood-corpuscles exhibiting a tendency to adhere to each other and to the walls of the vessels, until the latter are blocked up and there is *stagnation* or "*stasis*." Around such an area of capillary stasis there may be seen *congestion*,—a condition differing from stagnation to this extent, that the accumulated blood-corpuscles impede but do not stop the flow of blood through the vessels; while outside the congested district there is *determination* or fulness and rapid movement of blood. Then, as the result of this, we know that the liquor sanguinis exudes through the walls of the vessels; or sometimes even the coats rupture, and extravasation of blood-corpuscles ensues.

Again, in inflammation, the *purity of the blood* is frequently more or less disturbed. According to Mr. Wharton Jones, the most constant change is an increase of the fibrin in the plasma; less constant but yet frequent, a diminution of the red corpuscles; and still less constant an increase in the colorless corpuscles. But then, these alterations can happen independently of inflammation, increase of fibrin and diminution of red corpuscles being a normal result of pregnancy; while on the other hand, "the essential phenomena of inflammation may occur when the blood of the body generally is in a perfectly healthy state."* It is probable, however, that this latter event is only observed when the inflammatory action falls short of a certain extent and intensity. With regard to the *nervous force*, it is generally said not to be normal; but how it is changed we no more know than we can explain how it operates in ordinary nutrition. And, lastly, the *healthy condition of the part itself* is altered in the inflammatory state; this change being due to more or less degeneration from hindered nutrition, as well as to the penetration of such inflammatory products as lymph and pus into the elemental structures and the interstices between them.

Symptoms.—For some eighteen centuries the distinctive external marks of the inflammatory process have been said to be the combination of pain, swelling, heat, and redness: "Notæ inflammationis," says Celsus, "sunt quatuor, rubor et tumor, cum calore et dolore." The antiquity of this formula, however, must not lead to its too rigid adoption. In several of the cases which come under the physician's notice such a combination of phenomena is absent; while not only is this so, but occasionally we may be unable to discover any one of them. Pericarditis in an aged person, for example, has often run its course without giving rise to pain or any appreciable increase of heat. Yet after death, though no one of the symptoms will perhaps have been detected during life, unmistakable evidence of inflammatory action has been found in the presence of an excessive exudation of liquor sanguinis.

Then in speaking of the constitutional symptoms, great stress is always laid on the occurrence of a remarkable buffiness of the blood, and fever. As regards the *blood* it will be found when drawn from the body to exhibit, after standing and coagulating, the *buffy coat; i. e.*, the upper portion of the clot consists of fibrin unmixed with red corpuscles. It must be remembered, however, that this appearance is not characteristic of inflammation; for it generally arises when, from any circumstance, the fibrin coagulates more slowly, or the corpuscles subside more rapidly, than in healthy blood. It is also frequently found in the blood of plethoric persons, and in that

* "On the State of the Blood and the Bloodvessels in Inflammation," by T. Wharton Jones, F.R.S. Guy's Hospital Reports. Second Series, vol. vii, p. 76. London, 1851.

of pregnant women. Sometimes the surface of the buffy coat is contracted and concave: the blood is then said to be both buffed and cupped. As soon as the inflammatory action reaches a certain degree, the nervous and vascular systems become affected: the general derangement which ensues being described as *inflammatory* or *symptomatic fever*, or as *constitutional disturbance*. This fever manifests itself by depression, chilliness followed by heat, frequency of pulse, headache, a furred tongue, thirst, and loss of appetite. Repeatedly, the chilliness amounts to shivering; while it is generally allowed that the onset of spontaneous inflammations is more frequently attended with rigors, than that of inflammation due to external injury. The intensity of the inflammatory fever will depend upon the nature of the tissue affected, the extent of the mischief, and the constitution of the patient. It is sometimes so slight as to escape notice; though always well marked when the nervous and circulating systems have not previously been enfeebled by disease or age.

The chemical examination of the *urine* shows a certain variation from the normal composition. Thus, the *chlorine* being chiefly derived from the chloride of sodium taken with the food, its amount will of course depend on the quantity of salt thus consumed. Hence, in acute inflammatory diseases where there is always complete anorexia, we should expect to find the chlorine constantly diminishing, until the morbid action has reached its highest point; an increase occurring as restoration to health gradually takes place, and as the power of assimilating food returns. Accordingly this is what really happens in all acute diseases, except in the case of intermittent fevers. The investigations of Neubauer and Vogel have shown, that the secretion of chlorine is usually increased during the paroxysms of these fevers, and sometimes for a short time after them; though the mean daily quantity is somewhat less than normal. This point will be found further noticed in the sections on *Intermittent Fever* and *Pneumonia*. In chronic disorders, the quantity of chlorine will likewise depend on the amount and nature of food taken, the strength of the digestive organs, and the non-separation of it from the body by watery stools, &c. Extra mental or bodily labor will also temporarily increase the secretion of chlorine. The proportion of *urea* secreted with the urine depends upon the extent of the tissue metamorphoses. It usually happens at the commencement of most acute febrile diseases that the quantity is increased, although the patient has no animal food. After the disorder has reached its culminating-point, the amount becomes less than normal; but it increases as convalescence gets established.

When the inflammation goes on to suppuration, the commencement of this event is commonly marked by the occurrence of shivering, and the constitutional disturbance is then called *hectic fever;* the leading symptoms of which are frequency and weakness of pulse, alternations of chilliness with heat and flushing followed by sweating, an excessive wasting of the body, and daily increasing debility. Hectic fever also accompanies other diseases, as all forms of phthisis, dysentery, &c.

Termination or Effects.—The most favorable termination is *resolution*,—the complete restoration of the part to its normal state. The term *delitescence* is now and then employed when the phenomena disappear suddenly and rapidly. If the inflammation only change its seat from one part to another there is said to be *metastasis*.

Then the effects of this process will perhaps be *formative;* that is to say, new particles or granules or cell-growths result, which are susceptible of further development. In this way we have serous effusions, varying in quantity from a few drachms to many pints; blood effusions, chiefly arising

from the rupture of new vessels in freshly formed material; and the exudation of coagulable lymph or fibrin, which may become a nidus-substance for the growth of new elements. On the contrary, the effects may be *destructive;* this is seen in suppuration, when pus-cells are developed from the elements of the degenerating tissue; in ulceration, a progressive softening and disintegration of successive layers of tissue; and in sloughing, gangrene, sphacelus, or mortification.

Where inflammation attacks the connective tissue, all the results of inflammatory action are likely to occur. So also when the larger glands and the solid viscera of the body suffer. In inflammation of the serous membranes, we expect there will be exudation of serous fluid and coagulable lymph or fibrin—in other words, that it will prove adhesive inflammation. The synovial membranes are less liable to this disease than the serous, and coagulable lymph is seldom poured out. The mucous membranes are rarely affected by the adhesive form of inflammation; but when attacked the inflamed membrane pours out serous fluid, or viscid mucus, pus, or blood—as is well seen in pneumonia, in which the extravasated or red corpuscles give a pathognomonic rusty tinge to the sputa.

Treatment.—The general principles only admit of being laid down, so extensive is the subject; but their importance is such that they deserve attentive consideration. In the commencement, the cause of the inflammation should, if possible, be removed. Attempts may then be made to obtain resolution; or, if this seem impossible, the next best termination, which, in cases of external inflammation, will generally be suppuration; in internal, sometimes suppuration, sometimes adhesion. The important point, then, for consideration is this: How are these desired results to be best attained? For very many years but one answer has been given to this question. The reply has been—by the adoption of the *antiphlogistic regimen;* which consists essentially in the use of low diet, bloodletting, active purging, counter-irritation, mercury, and antimony. It is to be feared that such remedies still find favor with some practitioners. I cannot but hope, however, that the more closely disease is studied, the smaller will become the number of those who recommend the use of these devitalizing agents. As my own experience has grown, so have I become more and more imbued with the persuasion that inflammatory action is not a fire to be put out by subtracting or withholding fuel. In the shape of general propositions it may be affirmed, that when an inflammation is established it is not possible to cut it short by antiphlogistic remedies; that general bleeding, unless carried to a very dangerous extent, will not sensibly diminish the amount of blood in an inflamed part; that bleeding will not render an impure blood pure; that depressing agents favor the extension of the morbid action, and deprive the system of the power of rallying from the effects of the disease; that in critical instances of inflammation there is depressed nervous power, together with impaired action of the heart; finally, in all cases a determined lowering plan of treatment is found to be very badly borne in the present day, whatever may be said to have been the case in former times.

The theory has found favor with some pathologists that inflammation, as we now see it, is of a different type to that which formerly existed; perhaps being more readily excited by malnutrition, being more prostrating, and possibly being more dangerous to life through its incapacitating the system for the same degree of reaction as that which formerly followed an attack. In other words, the febrile symptoms accompanying inflammation are said to have altered from an inflammatory to a typhoid character. This view was originally ably suggested by Dr. Alison, who

certainly said all that was possible in favor of such an argument.* On the contrary, its soundness has been well disputed by Professor J. Hughes Bennett;† who has consistently maintained and taught that inflammation is the same now as it has ever been, that the analogy sought to be established between it and the varying types of fever is fallacious, and that bloodletting and antiphlogistic remedies have been all along opposed to a sound pathology. As these opinions cannot be discussed with sufficient fulness in these pages, I would especially recommend the perusal of Dr. Alison's and Professor Bennett's very admirable essay to my readers. At the same time it is right to say I agree with the conclusions of Dr. Hughes Bennett. Many circumstances have led me to do so. Thus, amongst other points, I am thoroughly skeptical as to the soundness of the assertion which has been made that the human race is degenerating. Tubercular affections, the special result of deteriorated constitutional powers, are not more rife than they were. On the contrary, taking into consideration the increase of the population, the Reports of the Registrar-General for the last ten years, show a decline in their mortality to some extent in England. Yet if it were true that the physical powers of mankind are on the wane, such a result would hardly be possible.‡ Count Cavour died at the age of fifty from overwork, though it is much to be feared bleeding had much to do with his premature death. "Like most Italians, he firmly believed in the efficacy of bleeding, and was accustomed to be bled in every

* Edinburgh Medical Journal, May, 1857.

† Idem, March, 1857.

‡ The discussion very much resembles that which has often taken place as to the stature and strength of men at different epochs. Dr. Graves (Studies in Physiology and Medicine, p. 180, London, 1863) remarks upon this curious fact: "That from the most remote ages there has existed a singular propensity among mankind, to disparage the size of their contemporaries, and to represent it as diminutive, when compared with that of preceding generations. We find traces of this opinion in the works of various writers from the time of Homer and Hesiod down to the present period; indeed this is carried so far in the ancient authors, that whenever an old man speaks of the stature and physical powers of men it is only for the purpose of descanting on the degeneracy of the human race, and of referring with much complacency to the feats of superior strength and activity which he witnessed among the tall and athletic companions of his youth. That this opinion is not borne out by facts, is proved by the measurement of human bones found in the most ancient burial-places, by considering the stature of the Egyptian mummies, by the examination of ancient armor, and lastly, by inspection of the buildings designed for the abode and accommodation of mankind in former ages." And again the same author observes: "With respect to the strength of men, the same opinions have prevailed as with regard to size and stature. It has been asserted, that the men of the present time have degenerated from the vigor of their ancestors; and it is also maintained, that civilized man is inferior in strength to the savage who roams the wilds of Africa or America. Neither of these opinions appears to be well founded; bodily strength is the result of health, exercise, and a proper supply of wholesome food."

The reader who feels any interest in this strange controversy may also refer to the writings of Geoffroy Saint-Hilaire. He tells us (Traité de Tératologie, tome i, p. 170, Paris, 1832) that, in 1718, Henrion, a zealous supporter of the view that the men of ancient times were of larger stature than their present descendants, formed a table or chronological scale of the variations of the human stature from the Creation to the Christian era. According to this, Adam was 123 feet 9 inches high, and Eve 118 feet 9 inches and 9 lines; Noah was 20 feet lower than Adam; Abraham, was between 27 and 28 feet in height; Moses 13 feet; while Hercules measured 10, Alexander 6, and Julius Cæsar 5 feet. The human race thus progressively diminishing, were it not for the interposition of Providence, would have dwindled to the size of microscopic beings by this time. These reveries of the learned Henrion were founded on the tradition of the Rabbins, according to which Adam was at first 900 cubits high; but after he had sinned, God caused a considerable diminution of his size.

case of illness."* Just one week before his death, after walking about his estate at Leri, he got chilled; and not feeling better the next morning, had himself bled. On the following day he was also bled, apparently without advice; and then on the next day but one, he again lost blood by the wish of his physician. The death of this statesman seems to have directed the general attention of his countrymen to the subject of bleeding. And this attention was not given too soon; for in 1861 the lancet appears to have been as freely used in Italy as it was formerly in England, when some of our hospital out-patient rooms were compared to slaughter-houses. Dr. Borelli, in particular, has attempted to show his confrères that the depletory treatment of disease is injurious; and, in some articles contributed during 1863 to the Sardinian *Gazetta Medica*, he accounts for the necessity of substituting tonics and restoratives, for antimony and purgatives, and bleeding, by adopting this convenient change of type theory. Hence it becomes necessary for the supporters of this hypothesis, to allow, that while disease in Great Britain has undergone this change some twenty or five-and-twenty years since, it is only since 1860 that it has done so on the Continent. Then again, there is no connection between the type of epidemic disorders, and that of organic diseases. The type of the former has always varied. Indeed, there is but little uniformity in the progress of a single epidemic. Take that of cholera, for example. At the commencement of the pestilence the great majority of those attacked die; towards the close of it, by far the greater number of cases recover. But pneumonia, pericarditis, peritonitis, are in all respects the same diseases now that they were (to speak only of facts within my own knowledge) twenty years ago. And, moreover, if Dr. Alison be correct in all his assumptions, we must grant that not only the type but the cause of disease has changed; since, if we are to place implicit reliance upon the experience of Cullen, Gregory, Mason Good, and others, upon some points on which they are likely to have erred from the imperfection of the means of diagnosis, we surely must credit their statements where simple observation alone was necessary. Nevertheless, only some sixty years ago—to take one example from many—inflammation of the brain was supposed to be the constant cause of insanity; and the greatest men of the day believed that it invariably required lowering measures. At Bethlehem Hospital the system of treatment consisted of bleeding, purging, and vomiting in the spring months: "A certain day was appointed on which the patients were bled, another when they were purged, another when they were vomited. They were bled in May and again in June; *the precise time depended on the weather.* All this had been the practice for many years, and no better practice, it was stated, was then known."†

Again, for how many years were the sympathetic disorders of pregnancy attributed to plethora and bleeding resorted to, when, in fact, they were due to anæmia. Yet no one will argue that the blood of a woman with child is different now to what it was fifty years ago. The experiments of Andral and Gavarret showed that the mean normal proportion of blood-globules is about 127; that the essential character of plethora is that this proportion is greatly increased, while in pregnancy it may be said to be always diminished. Practitioners then began to remember that they had found but little advantage from bleeding in the disorders arising from the progress

* Cavour. A memoir. By Edward Dicey. Second Edition, p. 234. London, 1861.

† Further Report of the Commissioners in Lunacy to the Lord Chancellor, p. 78. London, 1847.

of gestation; though many, perhaps, like Dr. Sangrado, attributed their want of success to not having practiced depletion to a sufficient extent.

But something more may be said upon the practical bearings of the question, *i. e.*, upon the treatment of inflammation. On this point I think it may be remarked that those practitioners who have ventured to study the phenomena of acute inflammation for themselves, regardless of theories belonging to the past, and caring little whether disease has changed its type or not, are now mostly agreed that our treatment must be confined to simply attempting to guide the morbid process to a favorable termination; just in the same way as we at present try to conduct cases of typhus, small-pox, scarlatina, &c., through their natural progress, without making heroic and unprofitable efforts to cut short the disease. This object is to be obtained by supporting the vital powers, instead of lowering them; by avoiding undue interference as well as by assisting the excretion of effete products. If this be true, it necessarily follows that, during the early stages of the attack all sources of irritation ought to be removed, so that the patient may enjoy perfect quiet of body and mind; the sick-room should be well ventilated and kept at a temperature of about 60° Fahr.; the diet had better be light, and ice or cold water freely allowed; sedatives are generally to be administered if there be pain or much irritability; while, if the febrile excitement be great, salines and refrigerants may be ordered. Aperients will be needed where fecal matters have accumulated in the intestines, but they are not to be employed as derivants, *i. e.*, to draw blood from the inflamed tissue to the alimentary canal, since it is merely a mischievous delusion to suppose that they can have this effect. When the pulse becomes soft, or at all irregular or small, good broths and essence of beef and other nutrients are to be administered; milk and cream, and raw eggs will often prove invaluable; while directly there are indications of general weakness we may be sure that wine is required, in quantity varying from two or three to twelve ounces in the twenty-four hours. Where great exhaustion sets in, more especially if there be wandering or delirium, brandy must be substituted for wine. In all acute disorders the various organs are much weakened, so that their functions are either partially or entirely arrested. To give food when there is a perfect loathing of it, is worse than useless. But we may advantageously administer alcoholic stimuli, either to retard the destructive metamorphosis of tissue, to afford to the system the elements for the generation of heat, to repair the circulating energies, to supply a stimulus to the nervous system, or simply empirically, because experience has proved the great value of such remedies when judiciously prescribed, without teaching us how they act. And then lastly, as the period of crisis approaches, Dr. Hughes Bennett's example can be followed, of giving a diuretic, half a drachm of spirit of nitrous ether, with or without ten minims of colchicum wine thrice daily, to favor the excretion of urates; whilst, when a crisis occurs by sweating or diarrhœa, care is to be taken not rudely or unnecessarily to check it.

When disease is treated in accordance with the plan just sketched out, the physician soon learns that, if his prescriptions are somewhat tame they certainly do not aggravate the intensity of the morbid action; that the mortality of inflammatory affections, as compared with that of former years, is greatly lessened; while, where recovery follows, it does so with the intervention of a much shorter period of convalescence than when the opposite system is practiced. As a matter of fact, the success of the method is apparent from the following; During the fifteen years ending in May, 1863, Dr. Bennett had thus managed all the cases of pneumonia which had been under his care in the clinical wards of the Royal Edinburgh Infirmary,

amounting to one hundred and fifteen; of which number one hundred and twelve were dismissed cured, and three died. Rather more than half of these were cases of simple uncomplicated pneumonia, the average duration of which was some 13½ days. About one-sixth were double uncomplicated cases, their average duration being 20 days. If we examine seven of the complicated examples, it will be found that one supervened on bronchitis and emphysema, two on typhus fever, one on bronchitis and pleurisy, one on pleurisy with effusion of eight weeks' standing, one on rheumatism with heart disease, and one on severe rheumatism with endocarditis and pericarditis; the average duration of the pneumonia in these seven being 21¼ days. The three fatal cases were all complicated; the first, with uncontrollable diarrhœa and follicular disease of the mucous membrane of the small intestines; the second, with persistent albuminuria and anasarca; and the third with delirium tremens and universal cerebral meningitis.

Contrasting this result with that obtained from an opposite course of proceeding, it seems to me that all doubt on the subject must be removed. Thus, during ten years—from July 1st, 1839, to July 1st, 1849—648 cases of pneumonia were treated, by different physicians, according to the rules then enforced by all writers, in the Royal Infirmary of Edinburgh; of which number 388 were cured, 38 relieved, and 222 died. Again of 107 cases recorded by M. Louis in 1835, and treated by bleeding and tartar emetic, 32 died. So, of 648 cases treated by Rasori, in the hospital at Milan, by large doses of antimony, 143 died. Andral, in his *Clinique Médicale*, tells us that pneumonia is one of those diseases the treatment of which is at once most simple and most efficacious. The principal remedy is copious bloodletting; neither children, adults, nor aged persons being spared. Yet of the 65 examples narrated to prove the soundness of his principles, no less than 36 ended fatally. Moreover, Laennec, who bled moderately at the commencement of the disease, regarded the mortality as one in six or eight. And lastly, Dr. Dietl treated 380 cases of primary pneumonia, in the Charity Hospital of Vienna, thus: 85 by venesection, one death in every 5 resulting; 106 by large doses of tartar emetic, with one death in 5.22; and 189 by diet only, with one death in 13½, all the fatal cases moreover being complicated. The account given by Dr. George W. Balfour, in 1847, of Skoda's axiomatic defence of his views,—viz., that pneumonia was a disease which tended not to dissolution but to resolution, seems to have been the starting-point of the greatest change in medical practice which is likely to be seen in the present age. It was after this that the foregoing statistics were collected, and that a new era commenced.

At the same time that bleeding as an antiphlogistic remedy should be rarely if ever practiced, it may be remembered that a small loss of blood will often be beneficial, particularly in relieving excessive pain, and in moderating attacks of dyspnœa due to some obstruction to the circulation in the heart or lungs. As Dr. Bennett remarks: "I have often been struck, especially in cases where large thoracic aneurisms cause these symptoms, with the small loss of blood which will occasion marked relief. The same result may be hoped for in other cases where the congestion is passive, even when that is associated with active repletion of blood, followed by exudation. But I need scarcely remark that this mere palliative object of bloodletting is not the ground on which the practice has hitherto been based, and that in this point of view it requires to be very differently explained." The same observations apply to the use of tartar emetic; which is perhaps valuable in small doses, and combined with other neutral salts, to favor excretion by the skin, kidneys, or intestines; but most injurious when employed in the heroic way often recommended.

With regard to the use of mercury, there appears to be every reason to believe that its utility in controlling inflammation or in promoting absorption of the effused products, has been very much overrated; and indeed it seems highly probable that inflammatory diseases will progress more favorably without the use of this medicine than with it. Some practitioners even now, however, would be afraid to treat pericarditis or iritis without blue pill or calomel, although more than twenty years have elapsed since Dr. John Taylor's valuable contributions to clinical medicine were published,* in which it was clearly shown that the opinions then current on this subject required revision. For example, of the cases of pericardial inflammation on which this excellent physician founded his observations, four got well without any treatment; while in twelve, ptyalism was not succeeded by any abatement of the mischief. Moreover, in six others, ptyalism was followed by pericarditis; in three, by endocarditis; in two, by extensive pleurisy; in four, by pneumonia; and in one, by erysipelas and laryngitis. Again, in one instance, the pericarditis and pneumonia both increased in extent after ptyalism; while in only one was salivation followed speedily by relief, and in two or three by a gradual diminution. More recently, Dr. Henry W. Williams† has cured sixty-four cases of iritis, of every degree of severity, including its idiopathic, traumatic, rheumatic, and syphilitic varieties, without a dose of mercury, the treatment having chiefly consisted in sustaining the general system, in relieving pain by narcotics, and in keeping the pupil dilated by belladonna.

From all this the conclusion appears quite evident, that in the treatment of acute inflammatory diseases practitioners must be content to trust more to that natural tendency to recovery which is present, and less to heroic remedies, than they have been in the habit of doing; for it is highly probable, that though we may be able to guide inflammations to a successful termination, yet we cannot cut them short, while any rude attempts to do so will merely increase the patient's danger. The risk of all inflammations being in proportion to the weakness of the patient, the amount of blood-poisoning, and the complications which arise, it surely cannot be wise to go out of our way to produce debility, and thus favor the occurrence of toxæmia. But the fact is, and it ought never to be lost sight of, that "the body possesses a perfectly marvellous power whereby it protects itself against diseases, wards off some, cures in the best and speediest way many of those that have set in, and by a process of its own brings others more slowly to a favorable issue. This innate power is called the *vis Naturæ medicatrix*, being justly appreciated by physicians and philosophers, and highly praised by them. Of itself, it is sufficient to cure numerous diseases; in almost all, its influence is beneficial; and, moreover, the remedies that are in their own nature the best, are only of use in so far as they stimulate and direct and control this inherent virtue."‡

IX. DROPSY.

Dropsy [formerly more correctly called *hydropsy*, from Ὕδωρ = water + ὄψις = the appearance] may be defined as an accumulation of watery or serous liquid in some one or more of the natural serous cavities of the body,

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* The Lancet. London, May 17th, 1845, to October 31st, 1846.

† The Boston Medical and Surgical Journal, vol. lv, pp. 49, 69, 92. 1856.

‡ Conspectus Medicinæ Theoreticæ. Auctore Jacobo Gregory, M.D. Editio Quinta, sec. 65, 66. Edinburgi, 1815.

or a diffusion of this fluid through the interstices of the connective or areolar tissue, or a combination of both. The accumulation is sometimes an indirect consequence of inflammation, though more frequently it occurs quite independently of this process.

Dropsy is an important symptom of disease. Being a result of overdistension of the bloodvessels, and particularly of the veins and their capillaries, it will be found to arise from many different conditions. In general terms it may be said, that there is either some mechanical impediment to the circulation, or an altered condition of the blood,—either an excess of water, or an accumulation of excrementitious matters. Very commonly all these conditions coexist: in other words, there is impeded circulation, with blood rendered poor by a relative excess of water, while it is also contaminated with the elements of the bile or urine owing to hepatic or renal inefficiency. Consequently, each case of dropsy will present two classes of dangerous symptoms, viz., those due to the original disease, and those produced by the effusion.

Supposing the cerebral ventricles are distended with water, we say the patient has *hydrocephalus*. When serous fluid occupies the pleura or the pericardium, we technically speak of the diseased condition by the term *hydrothorax* in the one case and *hydropericardium* in the other. If the cavity of the peritoneum be the seat of the collected water, the complaint is called *ascites*. Dropsy of the tunica vaginalis testis is termed *hydrocele*. Should the connective tissue of one region only become infiltered with serous liquid, the part is said to be *œdematous;* while *anasarca* is the term applied to the more or less general accumulation of serum in this tissue throughout the body. Lastly, the combination of anasarca with dropsy of one or more of the large serous cavities is known as *general dropsy*.

Now, to understand the manner in which dropsy originates, it must be remembered that from all the internal surfaces of the healthy body, a kind of excretion or oozing forth of fluid is constantly taking place, accompanied at the same time by absorption. Consequently, when the two processes of exhalation and absorption are properly balanced, the surfaces will merely be kept moist. But suppose that the balance, from some cause or other, is disturbed. Imagine exhalation to take place more rapidly from the surfaces of one of the shut sacs, or absorption more slowly, than in health; or while exhalation is going on, let the power of absorption cease; under either of such circumstances it is clear that dropsy must result. It is probable that absorption takes place by the lymphatics, by the lacteals, and by the veins; the first removing the worn-out particles of the body, the second taking up the chyle from the alimentary canal, while the third imbibe the fluid exhaled from serous membranes. In dropsies, the veins and their capillaries are chiefly in fault. Assume, for example, that owing to the pressure of a tumor there is obstruction to the circulation through the principal vein of a district. The backward pressure which results must affect the veins, capillaries, and arteries; though in the natural order of events the veins and their capillaries may be supposed to suffer first. The resulting congestion prevents these distended vessels from taking up more fluid; while to relieve the turgidity, effusion of serum takes place through their coats. This effusion occurs most freely through the capillaries and small veins, because their walls are the most easily permeated.

When dropsies arise from defective absorption, they are called *chronic* or *passive* dropsies: when from excessive exhalation of serous fluid, *active* or *acute*. Those due to cardiac or renal disease, slowly producing some alteration in the blood, with obstruction to the circulation, are usually o

the first kind; those caused by cold, by sudden checking of the urine or perspiration, by the poison of scarlatina, &c., of the second.

The *causes* producing those conditions on which dropsy depends, are, firstly, any circumstances which can induce irritation or congestion of secreting tissues—as cold; the sudden retrocession of exanthematous eruptions; and the poison of gout, rheumatism, &c. Secondly, whatever weakens the tissues or impoverishes the blood—as insufficient food, loss of blood, exhausting diseases, malaria, and scurvy. And thirdly, anything which obstructs the circulation and produces venous congestion—as obliteration of the veins; the pressure of inflammatory products and of tumors; as well as organic diseases of the heart, lungs, liver, spleen, and kidneys.

The *symptoms* of dropsy will vary somewhat according to the morbid state which has originated the effusion. It is now generally admitted that blood deteriorated by an undue proportion of water, or blood charged with excrementitious materials, or blood containing a large excess of colorless corpuscles, has its circulation through the capillary vessels much impeded. As this impediment is most felt at the parts furthest removed from the influence of the heart's action, and where the force of gravity in the common position of the body is greatest, so it is in these districts that the transudation of serum through the coats of the choked-up vessels first occurs, while the process of absorption is also arrested. Hence, the dropsy in these cases often begins in the form of œdema about the feet and ankles. If the disease be not arrested in this stage, the œdematous state extends up the legs and thighs; the scrotum and penis, or the tissues about the vulva, get infiltrated, and ascites soon follows. Considerable suffering is produced by the dyspnœa; which is urgent in proportion to the amount of anæmia, and the extent to which the action of the diaphragm is interfered with by the abdominal effusion. The urine is scanty, and often contains an excess of urates; but it is only albuminous where the kidneys have become secondarily implicated. And then there are such other symptoms as palpitation, deficient perspiration, mental distress, thirst, constipation, daily increasing weakness, &c., which need not be further dilated on here, as they are not peculiar to dropsy from anæmia.

Disorganization of the mitral or of the aortic valve, or of both, is the most frequent cause of cardiac dropsy. The spoiled valve sooner or later interferes with the circulation to an extent which cannot be overlooked. At first, perhaps, there is only shortness of breath on any exertion being made, together with palpitation and debility. Then, the feet and ankles begin to swell; the skin putting on a peculiar white and glistening appearance. As the effusion extends upwards, rest in the recumbent posture becomes impossible: while only unrefreshing dozes or snatches of sleep can be obtained. The heart's action gets daily more and more embarrassed; and a confused or indistinct systolic murmur is detected. The lungs become greatly congested; and moist crepitating râles are especially heard over their lower and posterior portions. Frothy sputa, sometimes streaked with blood, are coughed up. The eyeballs protrude: the alæ of the nose distend widely with each expiration. The urine is scanty: unless the circulation through the kidneys be much interfered with, there will not be found any albumen. In the same way, if the hepatic circulation be unimpeded, there will be little or no peritoneal effusion. But in either case, the general symptoms increase in severity. The dyspnœa becomes most urgent. And death generally occurs from apnœa, the dropsical pulmonary tissue gradually becoming useless for its natural functions.

In hepatic dropsy, ascites is the most significant symptom. Whether the

original disease be of the form of congestion and hypertrophy of the liver, or chronic hepatitis, or cirrhosis, or cancer, the dropsy will generally commence in the form of effusion into the peritoneum. The œdema of the extremities sets in subsequently. As the ascitic fluid increases, so those symptoms of hepatic disease which have shown themselves for some time previously become more marked and severe. The attacks of sickness, the constipation and unhealthy stools, the sallow or jaundiced skin and conjunctivæ, the urine loaded with bile or urates, the restlessness and weakness, as well as the wearying pain and fulness and tenderness in the right hypochondrium,—all these results of a greatly impeded flow of blood through the portal system of vessels point to the liver as the origin of the suffering, and tax the skill of the practitioner to the utmost for their relief.

Acute renal dropsy, or acute inflammatory dropsy, arises when the functions of the skin are suddenly suppressed, thus allowing certain morbid materials to accumulate in the blood and so to set up inflammation in the secreting tubes of the kidneys. Typical examples of this form of dropsy are seen when, from exposure to cold, the action of the skin is checked during the stage of desquamation in scarlet fever; compelling the kidneys, as it were, to remove a poison from the system which is particularly obnoxious to their tissues. In such cases, the urine either gradually or all at once, becomes scanty and of a dark-brown color; while on being tested, it is found loaded with albumen. About the same time general dropsy sets in. There is effusion of serum, more or less copious, into the connective tissue all over the body, as well as into the serous cavities—especially the peritoneum. This is followed, in cases about to prove fatal, by complete suppression of urine, with all the symptoms of uræmic poisoning—convulsions, coma, &c. Death, however, is an exceptional occurrence in these instances; unless the renal inflammation has been so severe and extensive, that the tubes have become universally choked with epithelium and fibrinous exudation.

Cases of chronic renal disease are frequently accompanied with dropsy. This usually only happens, however, at a late stage, when the composition of the blood has got altered, and when the circulation through the kidney has become obstructed. There is œdema of the connective tissue, followed by effusion into the pleuræ or peritoneum. In these instances, the tendency to dropsy is increased by the coexistence of valvular disease of the heart.

The *prognosis* in dropsy generally will depend upon the cause. Where there is no organic disease of important viscera, a cure can be frequently effected. In cases of spontaneous recovery, the disappearance of the effusion is accompanied by abundant sweating, profuse diuresis, or diarrhœa with copious watery stools. Where the kidneys or heart or liver are permanently affected, the dropsy can sometimes be, at least temporarily, removed. Death may ensue from the dropsy; or from some inflammatory intercurrent disorder,—as pleurisy, or peritonitis, or enteritis; or from the primary organic disease.

The *treatment* of dropsy will be discussed in speaking of the different disorders of which it is the consequence. But it may here be remarked that in all cases two indications necessarily require to be followed, viz., the cure of the effusion, which is only the symptom of other disease, and the relief of the disease itself. For the former we trust chiefly to diuretics, purgatives, diaphoretics, emetics, and the mechanical removal of the fluid by tapping and acupuncture. At the same time it is necessary to maintain, as far as is practicable, the general nutrition of the system.

One of the most celebrated of the ancient Greek physicians, Aretæus,

was of opinion that success in the treatment of dropsy was due more to accident and the favor of the gods than to remedial measures. And if by "success" a permanent cure of the organic affection be meant, no doubt the observation will still apply. Nevertheless, it must be remembered that in dropsy due to a fatal disorder, the patient may succumb to the former, long before the latter would in its uncomplicated course destroy him; and hence if this distressing symptom can be relieved or removed, life will probably be very materially prolonged.

Many authors on tropical diseases describe certain complicated cases of general dropsy under the name of BERIBERI, OR THE BAD SICKNESS OF CEYLON.* This obscure disease is almost unknown to pathologists in this country; though it is a frequent cause of death among European and native troops at Ceylon, and convicts in Indian jails. It would appear that a residence of some eight or twelve months in a district where it is endemic is necessary for its development. From the writings of Drs. Morehead, Aitken, and Waring, &c., I gather that the *symptoms* of this affection are chiefly great and progressive weakness, marked anæmia, lassitude and faintness, anxiety, numbness of the surface generally, with stiffness and œdema of the lower extremities. The trunk and face then become swollen, there is difficulty of breathing, the limbs get almost paralytic, and there is vomiting—sometimes of blood. The urine is almost suppressed, the thirst is great, the pulse is intermittent and frequent; and then flutterings or palpitations are experienced with a sense of suffocation, probably in consequence of the effusion of serum into the pleuræ and pericardium. Great exhaustion naturally follows; and within two or three weeks from the commencement, there is in most instances, death. Occasionally the fatal event occurs suddenly and unexpectedly—probably from embolism. The *morbid appearances* afterwards found are anasarca, œdema of the lungs, hydrothorax, hydropericardium, ascites, and cranial effusion. Cold and wet are the exciting *causes*, and hence beriberi occurs not unfrequently towards the close of the rainy season; while a watery condition of the blood, ill-health generally, and the consequences which follow a neglect of sanitary laws, are the predisposing conditions. Sometimes the effusion is encouraged by coexisting heart, liver, or renal disease; and often the persons affected are favorably circumstanced for the development of scurvy—that is to say, they have a scorbutic diathesis.

By way of *treatment*, attention to the means which prevent anæmia will be advisable, with chalybeate drinks, warm clothing, &c. Then, if the vascular action be not much depressed, purgatives may be cautiously used, as elaterium; or diuretics can be trusted to. I would suggest that a combination of digitalis and steel (F. 393) might prove serviceable. The vapor or hot-air bath often seems to be very useful. Probably the wet-sheet packing (F. 136) would produce greater action of the skin with less languor. Stimulants (especially gin) will generally be required, together with milk, soups, animal food, &c.

There are two remedies, much esteemed in parts of India, which ought not to be forgotten. Of these, *Treeak Farook*, the ingredients of which are unknown, but which acts as an aperient and diuretic when combined with rhubarb, is the best. *Oleum Nigrum*, prepared from the seeds of Celastrus Nutans, Benzoin, Cloves, and Nutmegs, is less employed. The dose of the former is from 5 to 15 grains; while of the latter 10 minims will be needed to produce a stimulant and diaphoretic effect.

* The name *Beriberi* is that given by the Malabars to this disease. *Beri* is the Singalese for weakness, and by iteration implies great weakness.

X. CANCER, OR CARCINOMA.

1. **GENERAL PATHOLOGY.**—There is scarcely an organ or tissue in the body which may not be attacked by cancer [*Cancer* = a kind of ulcer] or carcinoma [*Καρκίνος* = an eating ulcer]. This disease is not half as fatal to men as it is to women. The liability of the breast and uterus to be affected by it is considerable; otherwise cancer would seem to be more common in men, since the skin and bones and digestive organs are more prone to it in the male than in the female sex.* It is very uncommon in children; but when it occurs in them it is generally located in the bones or in the eye, or more rarely in the testicle or ovary.

A cancer may be described as a local manifestation of a specific disease of the blood; the morbid growth having incorporated in it peculiar materials which accumulate in the blood, and which the development or extension of the growth will tend to increase.† As it is of constitutional origin, so the removal of the local manifestation does not effect a cure; but the cancer returns either in the seat of the original disease, or in some other structure. Moreover, when the primary affection has existed for a variable period, secondary deposits are very apt to be formed in the lymphatic glands, lungs, liver, spleen, &c. It is in these two respects especially (the reappearance of the disease after operation, and the contamination of the neighboring lymphatic glands, &c.), that cancerous growths differ from benign tumors; although amongst the latter there are certain bodies which do recur and which are consequently known as recurrent tumors, while simple growths can also give rise to glandular enlargements by the irritation they set up. For these and other reasons which will presently be mentioned the foregoing definition of cancer does not meet with universal acceptance; since some authorities now assert that the disease is at first local, though at an early period it becomes general.‡ Any way, the practical point is that the surgon does not seem to be consulted while the affection is only local; for otherwise the assertion made in France that cancer is completely incurable could not have been successfully maintained, as it has been.

Although the tendency of cancer, however, is to increase constantly and rapidly until life is destroyed, yet, in a very few instances, it becomes latent; that is to say, after the disease has reached a certain line of development, it remains in a state of repose or suspension, neither advancing nor receding. Sir B. Brodie refers to a case where the cancer was quiescent for twenty-five years; Dr. Babington knew an instance in which scirrhus of the mamma became stationary for twenty-four years; Dr. Maurice H. Collis has seen two examples of scirrhus of the breast, each of which lasted

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* In England, during the eleven years 1856—1866, the deaths registered from cancer amounted to 78,479. Thus, beginning with the year 1856, the numbers run 5859, 6201, 6433, 6676, 6827, 7276, 7396, 7479, 8117, 7922, and 8293. Of the 8293 in 1866, the *males* counted 2532; a considerable proportion (1345) dying between 55 and 75 years of age. The *females* amounted to 5761; the period of greatest mortality being between the 45th and 65th years, in which time 3008 perished.

† Lectures on Surgical Pathology, by James Paget, F.R.S., &c. Second Edition, pp. 384 and 766. London, 1863.

‡ Several other theories have also been proposed to explain the nature of cancer. Thus, some have believed that the disease is of hydatid growth,—that independent organized parasites of the entozoa class are produced. Broussais with his followers regarded the malignant growth as the result of inflammatory mischief. A third theory assumes that the diseased part has the functions of a gland; secreting from the blood, and thus removing from the system, the cancer poison.

for twenty-nine years; and Sir Astley Cooper attended two women in whom the period of latency was respectively seventeen and twenty-two years. Equally rare is the spontaneous cure of cancer by inflammation, ulceration, and sloughing, or by fatty or calcareous degeneration. Yet it is certain, that through these means at least temporary, if not permanent, recoveries have been effected. And when we consider the matter fairly, the wonder is that a cancerous growth does not undergo spontaneous cure more frequently, rather than so very seldom. All cancer-cells have a period of development, growth, and decay; but, unfortunately, though they perish, they leave behind germs which perpetuate the structure. In a monograph *On the Healing Process of Cancer in the Liver*, published by Bochdalek, of Prague, in 1845, is described a mode of cure as it sometimes occurs in this organ, the disease breaking down into a purulent-looking matter, so that the fluid portion becoming absorbed, the whole shrinks together, merely leaving a small inert fibrous or fatty mass.

On submitting any cancerous growth to a minute examination, it will be found to consist of peculiar nucleated cells called "cancer-cells," and of their free nuclei, together with a milky fluid or semi-fluid mixture, termed "cancer-juice." The more dry and juiceless the growth, the less is its malignancy. The cancer-cells and juice are either infiltrated into previously healthy tissues, or they are contained in a stroma or bed of new fibrous tissue. The cancer-cells are of various shapes, being round, oval, fusiform, triangular, or elongated into one or more sharp processes; they vary in size from the $\frac{1}{700}$ to the $\frac{1}{2000}$ of an inch, the medium being $\frac{1}{1000}$; and they chiefly resemble in structure and aspect the secreting gland-cells. On magnifying a specimen of scirrhus about two hundred diameters, the cells will be seen containing a comparatively large, regular, oval or round, and well-defined nucleus. Sometimes two nuclei exist in the same cell, and each nucleus has one or two nucleoli. Moreover, mingled with these cells, we find free nuclei, and numerous degenerated cancer-cells; some of these cells appearing withered and full of oil-globules, others being transformed into granular matter, in the débris of which the nuclei lie loose. Whether cancer originates in the multiplication and abnormal development of the connective-tissue cells, as taught by Virchow, Weber, Klebs, and others, or whether it essentially results from the proliferation of the epithelial cells lining the acini or follicles or tubules of the affected organ, combined with an hypertrophy of the connective-tissue corpuscles, is uncertain. This latter view, originated by Cornil and supported by Waldeyer, seems probable. According to the last-named authority, when the epithelial cell-growth is much in excess, soft medullary cancer is the product; where the hypertrophy of the connective tissue greatly exceeds the epithelial proliferation, we have scirrhus; while, if both conditions occur in nearly equal proportions, firm medullary cancer is the consequence.

Lebert has insisted that the cancer cell is pathognomonic, that it can be distinguished from every other kind of cell growth, and that it positively indicates the nature of the formation. Dr. Hughes Bennett and Müller consider, on the other hand, that no single element is diagnostic. Hence, their opinion seems to confirm that generally entertained, viz., that the microscope is merely an aid to diagnosis; but that, conjoined with a consideration of the progress and form and general appearance of the morbid growth, the use of this instrument may frequently enable us to arrive at a correct conclusion as to the nature of any particular tumor.

Dr. Wilks, writing in 1858, states his conviction that cancer has no peculiarities which can always distinguish it from other morbid growths, or even from many healthy structures. He suggests, that if we make a list

of different abnormal structures, arranging them according to their rapidity of growth, disposition to spread, propagation, &c., those at the top of the scale may be called cancerous; but no boundary line can be drawn between the last which is styled cancer, and the next on the list which has acquired some other name. Or, again, if the term malignant be applied to the highest on the list, semi-malignant to those below, and innocent to the lowest, that still no clearly defined lines can be made between these divisions. Allowing the truth of these observations, I would still venture to point out that broad distinctions have been sought for where none could be expected. For just as there is a border-line so faint between the animal and vegetable kingdom, that it is often difficult to say decidedly to which world a particular zoophyte belongs, so we may arrange the different phases of health and disease with such method that it cannot be said where one terminates and the other commences. And yet, practically, there is but little difficulty. As was well remarked by Burke, though no one can say where twilight begins or ends, there is ample distinction between day and night.

The question is still sometimes raised, whether simple or benign tumors ever undergo degeneration into cancerous growths. Many surgeons believe this to be impossible, but more evidence is needed before this conclusion ought to be finally accepted. At all events, there appears little or no reason why cancer-cells should not be infiltrated into the tissues of non-malignant growths, as readily as into the textures of a healthy gland; unless, indeed, it be that the former are generally very much firmer and less vascular than the latter.

2. VARIETIES OF CANCER.—There are two principal varieties, and six sub-varieties of malignant disease,* most of the latter being probably mere modifications of the former. They consist of—

Scirrhus or Hard Cancer.
Medullary, or Soft Cancer.
  Epithelial Cancer.
  Colloid, Gelatiniform, Alveolar, Cystic, or Gum Cancer.
  Melanoid, or Black Cancer.
  Osteoid Cancer.
  Hæmatoid Cancer, or Fungus Hæmatodes.
  Villous Cancer.

A scirrhous cancer never becomes medullary or epithelial, nor does the converse happen. But a medullary or an epithelial cancer may become melanoid or hæmatoid; a scirrhus or a firm medullary will sometimes become osteoid; or either of the two chief forms can assume the colloid character.

In all forms of cancer there is one general sign which is looked upon as pathognomonic. This is known as the cancerous cachexia. It is recognized by the peculiar dirty-yellowness of the skin, the sharp contracted features, and the general loss of flesh, which constitute it; the detection being made more clear by noting the prostration of strength, the absence of all energy, and the despondency which accompany it. The general

* To avoid any error, it should be mentioned that the terms "cancer" and "malignant," employed in the text, are regarded as synonymous. The expression "malignant" is so generally used that, provided a definite meaning be attached to the word, I cannot see how any good would arise from abandoning it. Moreover, it is convenient, since it allows us to speak of the *degree* of malignancy of any particular variety of cancer.

aspect of the patient is indescribable; but when once observed attentively, it will generally be afterwards appreciated without difficulty. According to some authorities, this cachexia precedes the local manifestation; but my own experience leads me to agree with those who regard it as a secondary effect, and as being a measure of the general systemic mischief.

A rough comparison of tubercular with cancerous disease, showing how they resemble each other and how they differ, is not without interest. The following are the chief features of such a sketch: It is doubtful if tubercle and cancer are to be structurally distinguished from each other in their early stages. There is no end to the number of tubercles which may be scattered through the body, as there is no limit to the masses of cancer which can invade the different organs. Tubercle has an early tendency to die; fatty degeneration gradually progressing from the centre to the circumference of the tubercle, until the whole softens down and gives rise to a cavity or "vomica." In cancerous tumors there is a like tendency to fatty degeneration: the morbid tissue undergoing disintegration leading to the formation of increasing ulcerations. Cancerous parents transmit a tendency to cancer to their offspring; whereas phthisical men and women seem more frequently to communicate a tendency to cancer to their children, rather than a disposition to tubercle. In tubercle, despondency is the exception, the patient frequently seeming to be unaware of the gravity of the disease until it is far advanced; but with cancer there is great mental depression from the very commencement, and often before there is any local manifestation of disease. In tubercle, night sweats and diarrhœa are prevalent; while in cancer they are rare. With tubercle there is, at an early date, an increased temperature of the body, besides an abnormal frequency of pulse; neither of these conditions being present in cancer. Tubercle is principally a disease of early life and youth; cancer, of adults and the aged of both sexes. There is a tubercular facies as well as a cancerous facies, but they bear no resemblance to each other. And lastly, a progressive loss of flesh and strength takes place in both diseases.

A. SCIRRHUS, OR HARD CANCER.—This is the most frequent form of cancer. It is seen occasionally in the stomach, in the upper part of the rectum, and elsewhere; but most frequently, by far, in the female breast. Three varieties are recognized,—the simple, the atrophic, and the lardaceous. The first, or simple scirrhus, is characterized by tardy growth, great hardness, and a tendency to produce excessive induration of the tissues implicated in the infiltration. In the second, or atrophic variety, the tissues of the affected gland get gradually much contracted: so that the hard diseased portion appears to draw into its substance the healthy surrounding tissue by numerous radiating bands or lines. The affected gland finally becomes puckered up, until nothing seems to remain but the stony tumor. This tumor seldom acquires a large size. The third, or lardaceous kind, is easily distinguished by the development of fat which takes place with the disease; so that the affected gland is rendered larger than it was, and communicates a brawny feel to the touch. Regarded from a clinical point of view, the distinction of these three varieties of this form of cancer is not of much importance. They all present the same constitutional symptoms, run the same destructive course, and require the same general treatment.

In the breast, scirrhus [Σκιῤῥὸς = indurated] is found as an infiltration affecting part or the whole of the mammary gland. The diseased mass is extremely hard, correspondingly heavy, and inelastic; while the increase in size is not great, for the part of the gland affected is frequently not much larger than it was in health. The nipple gets gradually drawn in, while

the surrounding areola is also somewhat retracted; though these events are not peculiar to mammary cancer, for I have seen them produced by simple inflammation of the gland-tissue. After a variable period, the tumor, with the proper tissues of the breast in contact with its surface, and the skin, which is often adherent to it, ulcerate; a foul and excavated and spreading sore, with everted edges, being formed, from which there is a constant sanious discharge, and very often sharp attacks of hemorrhage. The ulceration sometimes extends from the skin inwards; sometimes from the substance of the cancer outwards. The amount of suffering varies; occasionally the pain being comparatively slight, though generally it is severe and lancinating, and consequently most exhausting.

As the local mischief advances, so the health fails; while the cancerous cachexia becomes fully established. The disease spreads to the lymphatic vessels and glands in the axilla. Secondary cancerous deposits, which are more frequently of the nature of encephaloid than scirrhus, may occur in almost every tissue of the body. They are most common in the pleuræ, lungs, liver, glands of the mesentery, bronchial glands, and long bones. The state of the patient is pitiable. Together with great bodily suffering, the mind is harassed at the knowledge of the distressing nature of the malady. At night there is hectic fever, with dry skin and parched mouth. Without narcotics sleep is impossible. Attacks of nausea and vomiting are common and urgent. There is often a tickling cough. The emaciation increases daily. The countenance is not only pale and anxious, but it presents a slight leaden hue; while the features have become pinched, and the lips and nostrils slightly livid. Pains, constant and worrying like those of rheumatism, extend over the body, especially to the back and lower part of the spine; the hips and shoulders being also the seat of wearying aches. As the pressure of the enlarged axillary glands obstructs the circulation through the arm, so the whole extremity swells to a surprising degree. Lying by the patient's side, supported on a pillow, this limb is as useless as a log of wood—indeed it is only a painful incumbrance. Care has to be taken to prevent bed-sores. All appetite has long ceased; though there is often much thirst. The force of the circulation diminishes almost hourly. There is forsooth life, but then it is life incumbered with everything that is undesirable. At length, the looked-for release draws nigh. Not unfrequently, death happens a few days earlier than is expected; either owing to a sudden increase of the exhaustion, or from thrombosis, or from suppression of urine and uræmia. With other instances, the sufferings are increased by the setting in of pleurisy and accompanying effusion, or of pneumonia. But more commonly the system seems to be thoroughly worn out; a short period of freedom from pain and misery ensues—without loss of consciousness; and then a calm sleep follows, from which there is no waking on this earth.

Scirrhus of the breast is very rare in men. The only example which has been under my charge, so far as can be recollected, was in a gentleman sixty-eight years of age; whose mother and two sisters had died of mammary cancer. The disease occurs in women most frequently between the ages of forty-five and fifty.

Records, made by Mr. Paget,* of 139 cases of scirrhus of the breast, watched to their conclusions, or to their survivals beyond the average duration, gives the following results: In 75 not submitted to operation, the average duration of life, after the patient's first observation of the disease, has been 48 months. In 64 submitted to operation, and surviving its im-

* The Lancet. London, January 19th, 1856.

mediate consequences, the corresponding average has been a little more than 52 months. The longest duration of life, in the former class, has been 216 months; in the latter class, 146: the shortest in the former was 7 months; in the latter, 7½.

B. MEDULLARY, OR SOFT CANCER.—Medullary [*Medulla* = pith or marrow], or encephaloid [*Ἐγκέφαλος* = the brain], or cerebriform [*Cerebrum* = the brain + *forma* = a model] cancers are of two kinds—soft and firm; the former being the most frequent. In either condition they are found in about equal proportion as separable tumors, or as infiltrations. As *separable* tumors, when occurring in the testicle, the breast, the eye, the intermuscular and other spaces in the limbs; as *infiltrations*, when occupying the substance of the uterus, the alimentary canal, the serous membranes, and the bones. The course of both varieties in their fatal career is rapid; the average duration of life, from the patient's first observation of the disease, being little more than two years. Moreover, they occur at an earlier age than other kinds of cancer, being sometimes met with before puberty. The *soft medullary tumors* are commonly round or oval, and present to the touch a sense as of the fluctuation of some thick fluid, so that the most experienced practitioners are often deceived. Such growths are very vascular; the material composing them resembles brain-substance partially decomposed and broken up; they yield abundance of cancer-juice on being pressed or scraped, and they frequently contain extravasated blood. The *firm medullary cancers*, on the other hand, are elastic and tense, but not presenting the stony hardness of scirrhus. In their shape and size they resemble the soft variety. They are also found to possess distinct investing capsules, or they may extend into the substance of organs.

Medullary cancer of the breast is so rare in this country, that even in our museums specimens are but seldom seen; on the Continent, however, this form appears to be more common. The lymphatic glands are much more frequently primarily affected with medullary cancer than with scirrhus.

a. Epithelial Cancer, or Cancroid Epithelioma.—Some difference of opinion exists as to whether this disease is really a form of cancer, or whether it is not an affection *sui generis*, consisting of an infiltration of cells of scaly epithelium, with a serous liquid different from cancer-juice. Hence some authors (Hannover) speak of it as "epithelioma;" others (Alibert) as "cancroid;" while others again (Paget) describe it as epithelial* cancer. In its clinical history it certainly resembles cancer, inasmuch as it returns after being removed by operation, it is prone to incurable ulceration, it affects the lymphatics seated near it, and it ultimately destroys the patient. On the other hand, it is peculiar in two respects—it is very little liable to multiplication in internal organs, and it appears often to be produced by local causes only. As pathologists seem divided upon this question, it will be better to treat of it in this place, as if it were undoubtedly a true form of cancer, a plan which has the unfortunate recommendation of being probably correct, while it is certainly convenient.

The disease is generally located in or beneath some portion of skin or of mucous membrane, especially upon those parts of the latter which most closely approach the skin in structure, as the lips, eyelids, prepuce, vulva, &c. The most common seats consequently are the lower lip, the tongue, the larynx, the nymphæ, the labia majora, the glans penis and prepuce, and the

* From Ἐπί = upon + θηλή = the nipple. Properly, therefore, the epidermis of the nipple; but now generally used for the layers of cells forming the cuticle.

cervix and lips of the uterus. Formerly, it often attacked the scrotum of chimney-sweeps; but, since the act of Parliament made the use of machinery imperative, the soot-wart has been less frequently seen. Epithelial cancer, wherever and however produced, may commence as a warty growth, or as a slight induration which speedily ulcerates. In the former case, its growth is comparatively slow; in the latter it makes rapid progress, the ulceration extending in all directions and destroying every tissue (even bone) which it meets with. The lymphatics become involved, and then gradually the chief symptoms of the cancerous cachexia manifest themselves. Its origin appears sometimes traceable to the irritation of soot, to that set up by the use of a clay pipe without a varnished mouth-piece, to that caused by retained secretions under the prepuce, as in phimosis, &c. Moreover, cases have been recorded which seem to show that a simple wart or pimple, when constantly picked or fretted, may undergo development into epithelial cancer. But it would be premature to assert, at present, that these causes are alone sufficient to excite the disease. That they can set it up when there exists a constitutional tendency to cancer is granted. And very possibly they may do more, only this point has yet to be proved.

True "cauliflower excrescence of the uterus" is, in all probability, always a variety of epithelial cancer. Commencing on the surface of the labia uteri in the form of small papillary or villous eminences, these elevations, by their gradual growth, and expansion, and branching, take on the peculiar cauliflower appearance. It is a rare disease; so much so that, during the six years I was physician to the Hospital for Women, there came under my care, according to the observations which I have recorded, 59 cases of carcinoma of the uterus amongst the out-patients, only one of which was an example of cauliflower excrescence; the remaining 58 being instances of medullary cancer, or of scirrhus, or, more frequently, of epithelial cancer not assuming the appearance of an excrescence.

Care must be taken to distinguish epithelial cancer from rodent ulcer and from lupus. *Rodent ulcer* has generally a somewhat circular shape with indurated margins, and it gradually spreads in all directions. It most frequently attacks the eyelids, next to these parts the nose or cheeks, and very rarely the auricle of the ear, while in some cases it has occurred on the vulva and in other regions. Then it does not affect the lymphatic glands; it does not destroy life, or only does so very slowly; and the general health is not injured for a long time unless there be pain or hemorrhage. This ulcer occurs about the middle period of life equally in both sexes, and it can be permanently cured. If a portion of the edge of the sore be minutely examined, it will be found to consist of fibrous tissue, and not of cell structures. As regards *lupus*, it is to be recollected that it commences frequently by the formation of a dull-red tubercle, which has its seat most often on the ala or tip of the nose; the resulting ulceration is slow, it is superficial, only involving the skin, and its edges are not indurated; it seldom commences after the middle period of life, and it has a great tendency to heal spontaneously.

Epithelial cancer occurs much oftener in the male than in the female sex, and is most common after the age of 50. When once established, it gradually progresses to the destruction of life, but more slowly than medullary cancer; rather less than four years being the average duration of life from the commencement. The degree of malignancy seems greater when the disease is seated on the tongue or on the penis, than when on the scrotum or the lower extremities. Moreover, the removal of the affected part by operation probably gives a better chance of recovery than the excision of any other variety of carcinoma. The essential character of this disease

may be said to be, that it is composed of cells of epithelium and their nuclei. The cells vary in size and shape; and are infiltrated, together with a juice or serous fluid, into the interstices of the affected tissues.

b. Colloid Cancer.—This variety of disease—to which the names of colloid [*Κόλλα* = glue], alveolar [*Alveolus* = a little trench], cystic [*Κύστις* = a bladder], and gelatiniform [*Gelatina* + *forma*] cancer have been applied—consists of a clear viscid substance somewhat resembling soft gelatin or gum. Its most frequent primary seats are the stomach, intestinal canal, omentum, and peritoneum; though it sometimes invades the breast, the glands of the neck, or the periosteum of the long bones. Secondarily, it affects the lymphatic glands, lungs, &c. A section of a colloid cancer presents to the naked eye a clear, soft, gelatinous mass, intersected and surrounded by tough fibrous-looking tissue; the intersections, when numerous, forming small cysts or cavities filled with colloid matter. Such a cancer often attains considerable size. Thus, in the Museum of King's College there is a preparation showing a tumor of this nature, connected with the omentum, as large as a cocoanut. The disease probably always occurs as an infiltration, superseding the natural tissues of the affected part as it grows. It occurs equally in both sexes; it is very rare in children; and in its progress and symptoms it corresponds with other cancers, save that it less frequently ulcerates.

Colloid matter may form independently of cancer, as happens sometimes in the thyroid gland in bronchocele, and in some multilocular ovarian tumors. The latter often attain an immense size; but they may be removed by operation without any fear of the return of the disease.

c. Melanoid Cancer.—Melanotic [*Μελανόω* = to grow black], melanic, or black cancer, is generally medullary cancer modified by the superaddition of a black pigment. Scirrhus sometimes becomes associated with melanosis, and still more rarely epithelioma does so.

d. Osteoid Cancer.—The nature of osteoid [*Ὀστέον* = a bone] cancers may be best expressed, according to Mr. Paget, by calling them ossified fibrous or medullary cancers; and by regarding them as illustrating a calcareous or osseous degeneration. Their growth is usually from some bone, and especially from the lower part of the femur. Their general history corresponds to that of the scirrhus and medullary varieties of cancer. They are as malignant and as quickly fatal as the medullary; and they give rise to secondary deposits in the connective tissue, lymphatics, lungs, &c.

e. Hæmatoid Cancer.—Hæmatoid [*Αἷμα* = blood + *εἶδος* = form] cancer —fungus hæmatodes—is probably a soft medullary or other cancer, the substance of which has become more or less infiltrated with blood. When it protrudes through the skin it forms a large vascular mass, somewhat resembling a clot of blood. As can be imagined, while ulceration goes on the attacks of hemorrhage are frequent and frightful.

There are certain *sanguineous cancerous tumors*, which, on account of their rarity, have hardly received the attention they merit. These growths are rich in bloodvessels, and in splenoid tissue analogous to the placenta. Most of them are situated in or near the bones, they are very vascular and often pulsatile, and they look like a piece of spleen or of raw soddened meat. They recur after extirpation, while generally their growth is rapid. I have seen only one instance of this form of malignant disease; and in this case the tumor grew into the cavity of the mouth from the side of the lower jaw. It was removed by Sir William Fergusson, but soon returned. Again it was excised, but how far this last operation proved successful I do not know.

—Villous [*Villus* = shaggy hair] cancer is a variety
perhaps of epithelial cancer, occurring most frequently
of the urinary bladder. The histories of cases
with those of medullary cancers.

CANCER.—With regard to the causes of this disease
classes of society are equally subject to it; the
industrious, the gay and the melancholy, all
proportions. The only probable predisposing
: (1.) Descent from a phthisical parent, as will
(2.) Descent from a cancerous parent. Lebert
tendency in about one-seventh of a certain number
found it in 8¼ per cent. (3.) Age. The greater propor-
in men, occur between the 55th and 65th years; in
and 55th. Under maturity, cancer is rare in
the disease is twice as common in women as
for out of 92 cases of uterine cancer, the
published in 1863, no less than 80 had borne children.
mother of "several" children; while the others
amongst them, or an average of about 6½ to
above the proportion in England. And (6.)
contagious in the ordinary sense of the term, yet
entertaining an opinion that if fresh cancer-
the blood, they may be deposited and propagate
"The experiment has been tried on dogs
by Lebert; and cancerous tumors were found in
were killed some time afterwards; yet it
of the tumors found in these cases may
inoculation."* The experiment of Langenbeck,
by Vogel, but without producing the same
in his attempts at inoculation.
foregoing shows, that our knowledge of the
In the great majority of cases the pa-
account for its origin. Very frequently, in
the tumor is only discovered by accident.
mental anxiety, peculiar temperaments,
&c., have nothing to do with producing
is deposited in the most active organs;
an injured or weak part. Hence it
a blow, or an attack of inflammation.
to the histories of patients afflicted with
struck with the frequency with which
of one or more of their relatives from
been thus excited, careful inquiries have
carcinoma which have come under my ob-
been, that I have much less frequently
tendency to this disease, than to phthisis.
mother has died of phthisis, one or more
similarly, and one or more from cancer. I
same time, a young man of the age of 24
lungs, while his sister has been my patient
two being the only offspring of a mother
at the age of 30, but whose father was

* Seventh Edition, p. 112. London, 1856.

alive and healthy. This proneness to cancer in the offspring of tubercular parents has also been noticed by Mr. Zachariah Laurence, who seems rather inclined to entertain the opinion that there may be some connection between the two diseases. At all events, he says, that of 40 patients, the subjects of scirrhus or encephaloid, 15 knew of one or more blood-relations having died from phthisis.* Mr. Weeden Cooke has pushed the inquiry much further. From his experience he believes that phthisical parents beget cancerous offspring, while cancerous parents have phthisical children.† An examination of the histories of 79 examples of cancer of the breast which have been under this gentleman's observation shows, that three-eighths of these cases occurred in persons having phthisical relatives.

4. **TREATMENT OF CANCER.**—The treatment of cancer is at present, as far as I positively know, in just the same unsatisfactory condition as was that of phthisis only a few years ago. But inasmuch as we have sure grounds for believing that well-defined cases of pulmonary consumption, which would have been regarded as utterly incurable a few years since, are now sometimes restored to health by the aid of medicine, so we have every reason to trust that at no distant day cancer may be made to yield to some remedy, or combination of remedies, yet to be discovered. In the meantime very much may be done to relieve the patient's sufferings, and to prolong life.

PALLIATIVE TREATMENT.—The great point is to keep up the constitutional powers to as near the standard of health as the disease will allow; which can best be done by tonics, nourishing food, pure air, warm clothing, great cleanliness, removal of offensive discharges, mental occupation, and by preventing or relieving pain. In carrying out this important indication, the physician will not only be deservedly earning the gratitude of his patient, but he may, likewise, by kindness and judicious advice, be preventing him from consulting those callous charlatans who will make the most solemn assertions of their ability to cure him, until he either sinks into the grave, or has expended every guinea that he possesses. Moreover, it is the positive duty of the practitioner to make every effort to give even temporary relief. The remark of Bacon, though of universal application, should have especial weight here. He says: "I esteem it the office of a physician not only to restore health, but to mitigate pain and dolors, and not only when such mitigation may conduce to recovery, but when it may serve to make a fair and easy passage."

The best course to pursue, in addition to adopting all those generally known hygienic measures for the maintenance of health, is to do all that is possible to relieve pain; to improve the blood by tonics and nutritious food; and to check the growth of the cancer and the contamination of the system by suitable remedies.

First, *as to the Relief of Pain.*—This is a most important object; inasmuch as the great bane of cancer, next to its tendency to destroy life, is the acute physical suffering to which it gives rise. And not only is this so, but it is certain that the more intense the pain, the more rapidly will the patient succumb. Many practitioners appear insufficiently impressed with these facts; and they hesitate to effect a certain good by the proper administration of sedatives, lest they should check the secretions, destroy the appetite, or produce other doubtful evils. So much benefit, however,

* The Diagnosis of Surgical Cancer, Second Edition, p. 62. London, 1858.
† On Cancer: its Allies and Counterfeits, p 85. London, 1865.

has resulted from the free use of anodynes in my hands, that a reconsideration of this subject cannot be too strongly urged. Drugs of this class have a most favorable influence upon the mind as well as on the body; while they enable us to prolong life, by rendering that life bearable. Moreover, the more carefully the phenomena of this disease have been studied at the bedside, the more probable it has appeared to me that if a cure for cancer be ultimately discovered, it will be found amongst agents possessing narcotic properties. On one point I feel certain, that the irritation of malignant ulcerations by caustics and astringents is most injurious in every way, while the application of soothing remedies is just as beneficial. In making this remark it is necessary to explain that I am not referring so much to the total destruction of cancerous growths by potential escharotics, as to their irritation by the superficial application of these agents. And, if we think of the matter, it cannot but seem probable that nothing is so likely to increase cell-growth as stimulation and heat. If we take cancer of the uterus, for example, in whatever stage the disease may be, the local use of nitrate of silver, of acid solution, of nitrate of mercury, of lotions containing bromine or iodine, or of caustic potash, can only prove irritating and set up bleeding or other mischief. On the contrary, sedatives employed to the seat of disease are of great service. A compound of opium, conium, and belladonna is invaluable. These agents, mixed together with sufficient oil of theobroma, can be readily applied by the patient herself, in the form of a pessary (F. 423).

The mode in which the narcotic is administered is a matter of no little moment. As a general rule, I believe the least efficient plan is to give it by the mouth; but if *opium* be prescribed in this way, I would recommend the extract to be used in the form of pills, in preference to any other preparation (F. 343). Frequently it will be better, in order to avoid producing constipation, to give this drug in combination with belladonna (F. 344). The dose at first should be small; but week by week it must be increased, as the system gets gradually accustomed to it. In this way, large quantities at length become needed; but I have never seen anything but good from even such an amount as twenty-five or thirty grains in the course of the twenty-four hours. *Morphia* can also be given by the mouth; either in the form of pills (F. 343), or in combination with chloroform and Indian hemp, and ether, and hydrocyanic acid, &c. (F. 315, 317). But of all the methods for exhibiting the agents under consideration, no one plan is so valuable as the *subcutaneous injection of morphia*. By this process the most complete and speedy relief is afforded; generally with the great advantage of not deranging the stomach. Considerable caution, however, is necessary with the first injections, even when the patient has been taking morphia by the mouth for some time; and certainly it will be advisable for the practitioner to feel his way by commencing with only a small dose—one-third or a quarter of a grain. The reason for such care being needed is the fact, that while none of the morphia can be lost it is at once absorbed; whereas, when introduced into the stomach this drug gets diluted with the gastric fluids, and probably is not completely taken into the system for an hour or more. In some instances one injection in the twenty-four hours will suffice to insure a good night's rest, with a comfortable calm day; but in others it has to be repeated every twelve hours (F. 314). *Aconite* and *atropine* may be employed in the same way, though if possible with greater precautions. The exhibition of one or two minims of the officinal liquor atropiæ sulphatus (min. 1 = gr. $\frac{1}{120}$ of the salt), mixed with the solution of morphia, not only increases the efficacy of the latter as a destroyer of pain, but causes a more refreshing sleep than the morphia alone. Next in value

to hypodermic injections I would place *enemata*, or *suppositories;* for making which the extract or liquid extract of opium, or the solution of morphia, had best be employed (F. 339, 340). There may be cases where *conium* or *henbane* can be advantageously administered; but usually these anodynes, unless combined with opium, have seemed to me very uncertain and inefficient.

Secondly, *the improvement of the blood by tonics and nutritious food* has to be considered. With reference to tonics none are generally so beneficial as the various preparations of *bark*. The compound tincture of cinchona, or the tincture of yellow cinchona, or the liquid extract of yellow cinchona, in full doses, may be recommended; either of these restoratives being combined with ammonia or ether (F. 371), or with the mineral acids (F. 376) where there is any tendency to hemorrhage or to night sweats. *Ferruginous tonics* seem seldom to agree so well as the bark, but there is often no objection to employing both. Thus, a draught with acetic acid and cinchona or quinine can be given night and morning; while the reduced iron, or the ammonio-citrate of iron, or steel-wine, or some similar preparation, can be administered during dinner in the middle of the day (F. 380, 394, &c.). *Cod-liver oil* is frequently very useful (F. 389); proving a valuable adjunct as a kind of food. Where its use is indicated but the stomach rejects it, attempts must be made to procure proper digestion by the simultaneous administration of *Pepsin* (F. 420).

As regards *diet* only the most nutritious food should be allowed. Wine, beer, milk, whey, cream, raw eggs, broths and soups, fish, and other animal food, are all necessary (F. 1, 2, 3, 5, 15, 17, &c.). And where there is so poor an appetite that but small quantities of these matters can be taken, it will often be advantageous to use some of them as enemata (F. 21, 22, 23). Under these circumstances, the opium already recommended had better be mixed with the nourishment; so as to avoid teasing the patient with more injections than are absolutely needed. At the same time it is to be recollected, that though the appetite be bad, there is generally a desire for fluids. Taking advantage of this, I am in the habit of ordering large quantities of good milk. When it seems apt to turn acid on the stomach, it will be as well to give it with soda or Vichy, or lime-water (F. 14). The addition of a lump of ice to each tumblerful makes this mixture agreeable, as well as grateful to the irritable stomach.

Thirdly, *we have to try and check the growth of the cancer and the contamination of the system.* And here it must be confessed that our ignorance is great, for we know of no mineral or vegetable product which possesses the required power. Iodide of potassium, iodine, mercury, iodide of lead, bromide of potassium, bromine, iodide of iron, iodide of arsenic, arsenious acid, puccoon, and a host of similar remedies, have been tried only with the result of proving their worthlessness. It seems indeed like the labor of Sisyphus to continue the employment of such agents. They do no real good, to say the least; and it is to be regretted that their use cannot be emphatically and finally condemned. Unfortunately nothing much more promising can be suggested; but the medicines which have appeared to me more nearly to fulfil our purpose than any others are *belladonna* and *acetic acid* in combination. A more extended experience is required before it can be right to speak of these agents with greater confidence. I commenced the use of belladonna unwillingly, because it was long since recommended, and was not thought to exert much influence for good. But in moderate doses, continued for several months, it has certainly been very serviceable in my hands; its utility having been augmented by giving it with full doses of acetic acid. And I would especially recommend that

when a cancerous growth has been removed by excision or caustic, the patient should perseveringly take the belladonna and acid for a very long time afterwards. Made into a mixture with bark or quinine or cascarilla (F. 376, 383), we have an excellent tonic; while the combination appears to have the power of moderating abnormal cell-growth.

By many, the preceding remarks will be deemed somewhat disheartening. But in the present state of medical science, the practitioner must be content to give relief to bodily suffering, and to afford mental tranquillity, without expecting to effect a cure of this fearful disease. It is in no slight degree gratifying to be able to accomplish only as much as this. And therefore while striving to increase our knowledge, let us remember that if the foregoing remedies be carefully and perseveringly used, peace of mind with bodily ease will be given; and thus life may be prolonged even for a few years.*

CURATIVE TREATMENT.—In attempts to effect a cure, one of three plans has usually been followed, viz., either complete and thorough excision; removal by the use of potential caustics; or the promotion of absorption by methodical compression, sometimes combined with the application of intense cold.

First, *as to Excision.*—A general opinion can only be formed with great difficulty, since the views of surgeons on this head are much divided. Still I think there are few who will deny, that as a rule, extirpation by the knife is quite insufficient to effect a cure. The operation may relieve the local distress, and will probably prolong life for a few months; while as the use of an anæsthetic renders the proceeding painless, it may perhaps occasionally be worth while resorting to it to gain these objects. Nevertheless, on the other hand, it must not be forgotten that the operation itself will possibly prove fatal; while in some cases it certainly appears to increase the malignity of the disease. Thus, Dr. Walshe points out that "excision of a cancerous tumor seems to awaken a dormant force. Cancers spring up in all directions, and enlarge with a power of vegetation almost incredible." Again, of the cases of cancer of the tongue which have been described by authors, the most frightful are those where the disease has returned after operation. Thus Mr. Weeden Cooke says that "the disease reappears with intense malignity, not only in the tongue itself, but in all the neighboring glands. The tongue sloughs more rapidly and bleeds profusely, the glands enlarge to an enormous size, interfering with the powers of deglutition; they then ulcerate, and discharge serum, or pus, or blood, rapidly destroying the patient by a hideous death. This is the rule in patients operated on: it is the exception in cases treated only constitutionally." With regard

* As illustrative of the correctness of these observations, the following case may be related: Mary Stanning, thirty-two years of age, married but never pregnant, came under my care at the Farringdon Dispensary, on the 20th March, 1851, suffering from scirrhus of the rectum. Finding that I could not cure her, she applied and was admitted into one of our metropolitan hospitals, which she left in an apparently dying state in April, 1852. On the 28th of the same month I was sent for, and found her very low, and as if she could not live many hours. The eminent surgeon under whose treatment she had been in the hospital, wrote to say that he had heard M. S. was under my care, that she was dying, and that he would like to be present at the post-mortem examination. By attendance to the hygienic rules laid down in the text; by the occasional exhibition of bark, of steel, and other tonics; by the employment of wine and nourishing food; and by the daily use of large quantities of opium, this patient slowly improved. She was able to get about, to keep her rooms clean, &c.; and although her sufferings at times were acute, yet she generally was tolerably free from pain until the last few weeks of her life. She died on the 18th June, 1856.

to the *time* at which, if an operation be determined upon, it should be performed, authorities differ. Some surgeons recommend excision when the disease is first discovered; others, as I think erroneously, advise delay. Mr. Spencer Wells, in laying down some precepts as to the use of the knife, observes: "It is not to use it in the early stages of cancer, not to use it unless the cancer is actually ulcerated, or growing so fast that the skin is about to give way. In such cases, especially where an open cancer gives great pain, and is wearing away the patient by bleeding or profuse fetid discharge, the knife is used in the hope of relieving suffering, and prolonging, not saving life. In some other cases, where a cancer causes great mental anxiety to a patient, you may remove it at her earnest entreaty, after explaining fairly the danger of relapse."* Now, knowing with what difficulties this subject is surrounded, it is necessary to speak with considerable diffidence of the views of others. But it does not strike me that these rules are those which ought to be generally followed by the profession, and I am not even sure that Mr. Wells adopts them. However this may be, my own opinion is that excision can only be resorted to with any prospect of success if the tumor be small and comparatively circumscribed, if the lymphatics be unaffected, if the skin and muscles be non-adherent, and if the cancerous cachexia be not developed. And even in these cases, it is necessary that a free dissection be made; at the same time removing, if possible, a portion of the adjacent texture, which though it look sound to the naked eye, may yet contain a few cancer-cells or their nuclei. It must also be doubted whether it is advantageous to procure union of the wound by the first intention; for many of those cases which have remained healthy during a more than ordinary length of time after operation, have had profuse suppuration set up by it. Moreover, the patient ought not to be lost sight of for many months afterwards; for whether removal be effected by the knife or by caustics, it will be advisable, as before recommended, to administer belladonna, and to attend to the diet, &c.

While speaking of the knife it had better be mentioned, that several attempts have been made to destroy malignant tumors by lowering their nutrition; with which object practitioners have tied the chief nutrient artery of the affected part. No real success has attended these efforts. Nor could it well be expected, remembering how readily the collateral circulation would be established after the operation. Section of the principal nerve going to the diseased structure has also been had recourse to, chiefly in the hope of relieving pain.

Secondly, *as to Removal by Caustics.*—This method has found both advocates and opponents in the present day; the latter class probably being the most numerous. Be that as it may, however, the process certainly possesses many important advantages. Thus, if properly employed, there is not the least danger to life. I have never known it to be followed either by erysipelas or pyæmia; while it may be found beneficial in deeply ulcerated, and some other cancers, where the knife is objectionable. My own experience with this plan of extirpating scirrhus and medullary tumors of the breast has been gradually increasing during the past few years, and the more I see of the practice the greater is my opinion of its merits. It frequently does not prevent the disease returning, but then it allows each recurring growth to be destroyed before attaining any size.† The chief

* On Cancer Cures and Cancer Curers. The Medical Times and Gazette. London, July 11, 1857.

† As examples I quote the following from my case-books: Mrs. S., æt. 47. June 13th, 1864. Clin. Med. v. 57. Has a scirrhus of left breast, the size of a fowl's egg. Catamenia only been on twice in last twenty years. Palliative treatment

agents which have been tried are the arsenical pastes, chloride of zinc, chloride of bromium, sulphate of zinc, manganese cum potassâ, the strong

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failing to retard growth, I removed the tumor on March 25th, 1865, after about seventeen daily applications of the saturated solution of acid sulphate of zinc (F. 198). From February 24th, 1865, until February 8th, 1866, a pill of quinine and belladonna and conium was taken twice daily. On the latter date, I reapplied the caustic to a swelling the size of a bean which had formed in the cicatrix. In a few days it came away: the pill was still to be continued. On May 9th, another small growth had appeared which was again attacked with caustic. The pill was replaced by a mixture of citric acid with bark. On July 6th, I found the disease returning in the nipple. As it increased it was removed with caustic, the wound being nearly healed by October. In December she was ordered a mixture of belladonna, acetic acid, and bark. On February 1st, 1867, there was another growth in the old cicatrix, and caustic was applied; while at the end of October two small tumors were found, which were removed as before. From this time, all has gone on well. There has been no return of the complaint. The cicatrix is soft and supple. She says (November 6th, 1868), that she is quite well, and her appearance confirms her statement. The mixture has been taken continuously for twenty-three months, and she is not to give it up yet.

Mrs. G., æt. 59. November 25th, 1864. Clin. Med. v. 239. Has a soft medullary cancer of right breast, as large as an orange. As she could get no relief, she submitted to its removal by the caustic, as in previous instance, on March 11th, 1865. So deep was the growth, that the cartilages of two of the ribs where they join the sternum became exposed. All did well, however. Belladonna was taken in a pill until March 8th, 1867, when it was discontinued, as she felt quite well and the cicatrix was healthy and soft. On July 2d, 1868, this patient continued well.

Mrs. P., æt. 52. July 28th, 1865. Clin. Med. 3276. Scirrhus of left breast, which has been growing rapidly since first discovered six months ago. The zinc caustic was first applied on August 20th. Tumor came away on September 4th. On July 14th, 1867, she remained perfectly well, and had just married for the second time. The cicatrix was barely to be distinguished.

Mrs. G., æt. 47. October 20th, 1865. Clin. Med. v. 478. Has a movable scirrhus of right breast. Caustic was applied daily for about twelve times: on November 14th the tumor was loose in the poultice. June 12th, 1868, I found two or three little tubercles in the old cicatrix. Has been taken acetic acid, belladonna, and bark since December 7th, 1866; and is to continue doing so, together with cod-liver oil. On October 31st, 1868, it was remarked that the tubercles are no larger: no pain. General health better than it was three months back. Is continuing the mixture and oil.

Miss W., æt. 21. June 10th, 1864. Clin. Med. v. 501. Has a very solid tumor, size of a walnut, in right breast. Is very nervous, as her mother's sister died of cancer of uterus. November 30th, 1865, I found the tumor as hard as a stone, larger, tender to the touch, and the seat of occasional shooting pains. On December 16th, 1865, the tumor came away, after seven daily applications of zinc caustic. Belladonna (gr. ½) was ordered daily, and taken for some months. September 10th, 1868, she told me that she was and long had been perfectly well. Cicatrix supple and healthy.

Mrs. H., æt. 49. December 7th. 1866. Clin. Med., 3882. Ulcerated medullary cancer of right breast. An eminent hospital surgeon has told her that she "has a very bad cancer, for which nothing can be done." December 29th, tumor came away, after five very free applications of the zinc caustic. On April 1st, 1867, my report says that the caustic has had to be applied to some small cancerous nodules: the slough came away to-day. General health has greatly improved. March, 1868, my notes say that last month, two or three suspicious tubercles were found about the old cicatrix. They were easily destroyed: wound healed, and looks quite healthy. September 4th, 1868, remains well. Has been taking a mixture of acetic acid, belladonna, and bark since beginning of treatment; and is still to persevere with it. Has become quite stout.

The foregoing are a few of what may be called successful cases. In addition, I have more recent instances which seem to be going on well. Contrariwise, I could quote others, where the same line of treatment has failed completely to save life. It is distinctly to be understood, however, that I am not recommending any infallible practice; but only one which frequently prolongs existence, which occasionally leads to a restoration to health lasting for some years, and which has no serious disadvantage beyond producing pain that can be considerably mitigated by subcutaneous injections of morphia and atropine.

mineral acids, and the concentrated alkalies. The *arsenical pastes* cannot be employed without great caution, inasmuch as their action is not merely local but pervades the whole system. M. Manec, of the Saltpétrière Hospital in Paris, has largely used them; for he believes that arsenic has a peculiar destructive affinity for cancerous growths, and that its action does not extend to healthy tissues. His formula—perhaps the best one which can be tried, consists of one part of arsenious acid to seven or eight of cinnabar, with four of burnt sponge, made into a paste with a few drops of water. He does not employ it to a surface of greater extent than the size of an English florin at each application; and he states that the quantity of arsenic absorbed from such a surface never produces unpleasant symptoms. Should severe pain arise, it will be mitigated by applying bladders of ice and salt. Dr. Marsden was in the habit of using an arsenical mucilage (F. 199); and I believe that he placed considerable reliance on its efficacy.

The *chloride of zinc* is a valuable agent, especially as there can be little to fear from its absorption. The epidermis must first be destroyed by a blister or by strong nitric acid; and the caustic is then to be applied (mixed according to F. 197), in quantity varying with the amount of destruction required. Dr. Fell's plan of treatment consists in the use of the chloride of zinc, combined with a perennial plant known among the North American Indians by the name of puccoon, but described by botanists—owing to the bloodlike juice which exudes from it when cut—as the Sanguinaria Canadensis (F. 197). The chloride of zinc is the essential agent, however, and this creates a superficial slough; which slough is daily scored to a certain depth by several incisions with the knife, strips of linen covered with the caustic being afterwards laid in the furrows. At each dressing, the tumor is destroyed deeper and deeper; until at length it becomes converted into a large eschar, which separates by a line of demarcation according to the general principles of surgery. Together with this local application, the general health is attended to; a nourishing and sustaining diet is allowed; and the puccoon is administered thrice daily in half-grain doses. Frequently also, Dr. Fell combines with this drug the sixteenth of a grain of iodide of arsenic, and one grain of conium.

The *chloride of bromium* has been highly praised by Landolfi, who uses it made into a paste with flour, or combined with other caustics (F. 197). The proper method of applying the paste is on a piece of linen cut to the size of the part to be destroyed. At the end of twenty-four hours the rag is removed; the slough separates after a few days; and the sore is then dressed with charpie soaked in a solution of chloride of bromium—grs. 10 to 20 in water fl. oz. 12. The patient takes a pill morning and evening, containing one-tenth of a grain of the chloride. I have tried this plan in one instance of cancer uteri; but while the local disease seemed to be much diminished by it, the patient died with all the constitutional symptoms unrelieved.

The anhydrous *sulphate of zinc* has been strongly recommended by Sir James Y. Simpson; who says, that when it is applied to an open and diseased surface it acts as a safe, most powerful, and manageable caustic. In these remarks I can entirely coincide. It may be employed in the form of a dry fine powder; or as a paste made with an ounce of the salt to fl. dr. j of glycerin; or as an ointment—one ounce to 120 grs. of lard. When used in either way to an open or ulcerated surface, the part to which it is applied is rapidly destroyed to a depth corresponding to the thickness of the superimposed layer; the slough usually separates on the fifth or sixth day; and there is left behind, if the whole morbid tissue be removed, a red and

granulating, and healthy wound, which rapidly cicatrizes. Until all the disease is destroyed, the applications must be repeated. The sulphate of zinc will only act as a caustic to a broken or open surface. Hence, when the epithelium is entire, this must be removed by a small blister, or by a strong acid, or by the supersulphate of zinc (F. 198). The application of the caustic gives rise to local pain and burning in most instances, but never to any marked constitutional disturbance.

The *manganese cum potassâ* is much used by Mr. Weeden Cooke in ulcerated cancer. It is said to be efficacious, causes but little pain, removes all unpleasant odor from the sore, and does not injure the general health. This agent may be employed as a powder, or made into a paste with water; while it must be applied in a layer as thick as the tissue to be destroyed. By means of carrot poultices the eschar is encouraged to drop off in three or four days; when, if necessary, the manganese is reapplied until the diseased mass is all destroyed. Then the subjacent healthy tissues are made to granulate and cicatrize by the aid of a slightly stimulating lotion of chlorate of potash. With regard to the *strong mineral acids* and the *concentrated alkalies*, but little need be said. If the former be used, sulphuric acid, made into a paste with saffron, will prove the most efficacious: if the latter, the Vienna paste (F. 204).

Thirdly, there remains for consideration the plan which chiefly has for its object *the promotion of absorption by methodical compression with or without the application of intense cold.* Now pressure is supposed to act beneficially in cancer by diminishing the supply of blood, and hence of nourishment to the tumor; by depriving the cells of the space necessary for their growth; by injuring them from direct violence; and by promoting their absorption. Since compression was first proposed by Mr. Samuel Young, in 1809, numerous cases have been treated by it by different surgeons; and certainly the results seem to have been more favorable than those produced with many other modes. The pressure, however, must be methodically and perseveringly applied; the most unobjectionable method being by Dr. Neil Arnott's apparatus, which consists of a spring, an air-cushion, supported by a flat resisting frame or shield, with a pad and two belts. "The effects produced by pressure are," says Dr. Walshe, "removal of existing adhesions, total cessation of pain, disappearance of swelling in the communicating lymphatic glands, gradual reduction of bulky masses to small, hard, flat patches, or rounded nodules (which appear to be, both locally and generally, perfectly innocuous), and in the most favorable cases total removal of the morbid production. The relief of pain afforded by the instrument is, without exaggeration, almost marvellous; this effect being insured by the peculiar softness and other properties of the air-cushion, the medium through which the pressure of the spring is transmitted to the surface."*

The efficacy of intense cold depends on its arresting the circulation, producing some change in the microscopic cells, and in its altering the vitality of the part. Congelation not only gives relief from pain, but is said to suspend the progress of the disease; though its influence in the latter respect is generally allowed to be very slight. In cancer of the uterus, the frigorific mixture—equal parts of ice and salt—may be applied by means of a gutta-percha speculum for fifteen or thirty minutes, once a day or even oftener. I have used it in a few instances only; for, although it was found to allay pain, yet it did not seem to possess the least potency as a means of cure.

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* The Nature and Treatment of Cancer, p. 211. London, 1846.

XI. RODENT ULCER.

Rodent ulcer [*Rodo* = to gnaw] was first described by Dr. Jacob, of Dublin, as a "Peculiar ulcer of the Eyelids." It is sometimes spoken of as Lupoid ulcer; a term, however, which had better not be adopted, since it is liable to mislead. Equally unadvisable is it, in my opinion, to speak of the disease as rodent *cancer;* for the affection has none of the general or local characteristics of the true cancerous ulcer. Rodent ulcers are most frequently met with on the face; especially about the eyelids, or over the malar bone, or on the upper lip. They are also sometimes formed on the scalp, and at the vulva; while in more than one instance I have seen this disease on the lips of the uterus.

This peculiar ulcer generally has its origin in some small and irritable pimple; or less frequently in a wart, or an old cicatrix. The tendency to ulceration is manifested very slowly; or it should rather be said, that several months elapse between the commencement of the disease and the time when it starts actively upon its destructive course. The affection commonly begins by the ugly wart, or the cicatrix, cracking; or the surface of the pimple gets abraded. At all events, a little sanious discharge escapes and forms a thin scab. The irritation set up by this scab, slight though it be, leads to its being picked off. A patch of excoriation is thus disclosed; which again scabs; is again scratched off, and so on until a small ulcer is revealed. As this enlarges, it presents some singular features. Thus it is found to have hard and rounded and elevated margins, with an indurated and irregularly excavated floor; it slowly but steadily spreads in circumference, and to a less degree in depth; while, from its uneven and somewhat glazed surface, a scanty ichorous matter escapes, which is free from smell. There is very rarely any discharge of pus or blood: if pain be experienced it is seldom acute. The surrounding skin is natural. As the ulceration with its hardened wavy border extends, so it destroys every structure in its course. Skin, connective tissue, muscles, nerves, vessels, bones—all seem to melt away before it. Hence the most frightful disfigurement results. No description is needed of the appearance which must follow from the destruction of the lip and gum and alveolar processes of the maxilla; or from the laying open of the nasal cavities; or from the erosion and exfoliation of the walls of the orbit, with the consequent collapse of the eye; or from the penetration of the disease through the skull to the membranes of the brain. All the time this serious mischief is gaining ground, the lymphatics and their glands remain healthy; or if the latter enlarge, they only do so to a slight extent, owing to irritation or some accidental inflammation. Moreover, no similar disease springs up at other parts of the body. The general health is maintained, too, in a surprising manner; so that until the last few months of life the patient's strength seems undiminished, he is able to eat and sleep well, and he could occupy himself in his accustomed duties, were it not for the repulsiveness of his appearance. When death occurs, it is due to exhaustion; this being sometimes rapidly increased towards the end, by attacks of hemorrhage. The disease is rare before the fiftieth year: it occurs equally in both sexes.

When a rodent ulcer comes under treatment at such a stage that an operation is feasible, a permanent cure may be effected by complete excision. The same result can also be obtained by the use of potential caustics, chloride of zinc, the supersaturated sulphate of zinc, potassa fusa, &c.; although great care must be taken to destroy every particle of affected tissue. Frequently, the caustic will have to be applied more than once;

but there is no objection to this being done, while the patient is under the influence of an anæsthetic, the subsequent pain being mitigated by the subcutaneous injection of morphia. The combination of excision with the transplantation of a healthy portion of skin from the forehead or other district, so as to prevent deformity, has produced excellent results in the hands of some surgeons.

XII. LUPUS.

By the word Lupus [*Lupus* = a wolf] is understood a spreading, tuberculated, inflammatory disease of the skin. It commences in the form of indolent little swellings or tubercles, which have a tendency to progress slowly to ulceration; but whether these tubercles become absorbed, or whether they ulcerate, there is always left a permanent seamed scar. This unsightly affection occurs in those who have not reached the middle period of life—mostly in young women with florid complexions. There can be little doubt that it is dependent upon, or connected with, the scrofulous diathesis. According to Virchow, the tuberculated substance of lupus is composed of young and soft and vascular granulation-tissue: while it arises in the connective tissue of the derma, and spreads inwards to the deeper structures. After a time, the centre of the tubercles softens and breaks down, an open sore or ulcer resulting.

There are two *varieties* of this disease, viz., the chronic form, or lupus non-exedens, and lupus exedens. This division is perhaps convenient; but I agree with Mr. Hutchinson that the difference between the two forms is chiefly due to the part affected. In a lecture on this subject he says: "If lupus attacks the nose, it will affect both skin and mucous surface; and as there is in the alæ of the nose little else except the opposed layers of these tissues, if they both ulcerate, destruction of the part must result, and the disease will earn for itself the name of exedens. If lupus attack any level surface of the skin, it will cause the formation of indolent tubercles, with but little ulceration, but still resulting in a scar, and here it will be called non-exedens. The difference depends solely upon the anatomical peculiarities of the part attacked."* It is not, however, denied that the degree of ulceration varies in different cases; but then it does not do so to a greater extent than happens in separate lupus patches on the same subject.

The form known as *chronic lupus* generally commences on the cheek, or upper lip, or lobe of one ear, or on some part of the trunk or extremities, as a small and reddish-colored tuberculated substance, around which other little tumors are gradually produced. Very slowly these effusions blend into a patch, which has the appearance of a yellowish-brown gelatinous structure beneath the cuticle. As this disorganized tissue becomes absorbed in the course of years, the deep fibrous structure of the cutis or true skin is rendered apparent, and thus is produced an irremediable seamed cicatrix. Very often the absorption proceeds irregularly; a scar being seen at one part of the patch, while there are tubercles at another—especially at the edges, whence the disease slowly spreads. In these cases there is no ulcer or even any excoriation, the cuticle remaining entire. Associated

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* Clinical Lectures and Reports by the Medical and Surgical Staff of the London Hospital. Vol. ii, p. 128. London, 1865.

with lupus non-exedens, small erythematous patches are sometimes observed on different parts of the skin of the face or of the extremities. Mr. Erasmus Wilson has seen them on the fingers, having the appearance of chilblains, for which they have been mistaken. These blotches may occur without any other lupoid disease. They vary in size, but seldom exceed an inch in diameter. Each patch is usually slightly raised, is circular, and of a purplish hue. The patches give rise to depressed white cicatrices. Owing to these characters, this condition has been described as *lupus erythematosus*. According to some authors, the erythematous form of lupus is believed to be the consequence of inherited syphilis; but no satisfactory evidence in support of this view can be adduced.

In *lupus exedens*—or *noli me tangere*, as it used to be called—the morbid action almost always commences on the nose. There are the same dull brown or red-colored tubercles, merged into patches, the surfaces of which crack and become excoriated. The fluid that exudes forms a thin scab; while underneath this, suppuration and ulceration slowly go on, spreading from the middle of the softened tubercle. As successive crusts form and fall off, so the destruction of the tubercle and skin and sometimes of the deeper tissues progresses. Leisurely but surely the devastation increases. As the ulceration extends, so there are often soft tubercles developed on the surrounding skin. The general appearance becomes frightful. The alæ nasi disappear, the bones perish, and the cavities of the nose are laid open. One or both of the lower eyelids will perhaps be drawn down on the cheeks, while the lips are perhaps drawn upwards. Indeed there is no end to the cruel deformity which may be produced; cases being on record where the face is said to have consisted of little more than one large and repulsive-looking cicatrix.

In the *treatment* of both forms of lupus, recourse must be had to constitutional and local remedies. With regard to the former, it is necessary to bear in mind that agents which impart tone to the system are needed. The diet ought to be nutritious; animal food twice a day, with plenty of milk night and morning, being most valuable. On the same principle, cod-liver oil proves serviceable. Country air has a favorable effect. Arsenic acts well as a tonic, though it is doubtful if it possess any special efficacy. Still, I have usually prescribed it in this disease, almost always giving it, however, in combination with quinine and iron (F. 381, 399), or with a mixture of the phosphates of iron and lime and soda, &c. (F. 405), or with the hypophosphite of soda and bark. In exceptional cases, a prolonged course of the liquor hydriodatis arsenici et hydrargyri (F. 51), or of the green iodide of mercury (F. 53), or of the red iodide of mercury (F. 54), or of iodide of potassium in decoction of sarsaparilla, or in bark (F. 31), or of iodide of iron (F. 32); for such, one or other of these medicines has seemed to be required.

The local remedies are of the greatest importance. In lupus exedens, the only hope of checking the destructive ulceration lies in the free use of powerful caustics. The best of these are the chloride of zinc, nitric acid, the acid solution of nitrate of mercury, and pure carbolic acid. Suppose we decide on the employment of the first of these, it should be thus applied: Every scab is to be peeled off, and the exposed sore cleaned and dried. If there be bleeding, pressure with the finger and lint will stop it. Then the caustic is to be thoroughly rubbed into every part of the ulcer, but especially to the edges; inasmuch as it is from the margins that the morbid action extends. Unless a healthy granulating surface results, the caustic is to be again had recourse to at the end of ten or fourteen days; the sore being dressed with simple stimulating lotions, or with a lotion of

the glycerin of carbolic acid and water, in the meantime. For the destruction of the tubercles and patches of diseased tissue in chronic lupus, caustics are also required. None are better than the chloride of zinc, or the acid solution of nitrate of mercury, or caustic potash, or carbolic acid. Some practitioners prefer a strong solution of iodine in glycerin. As in the management of rodent ulcer anæsthetics and sedatives have been recommended, so in the present case the patient is not to be deprived of the relief which the exhibition of these drugs is capable of yielding.

XIII. SCROFULA.

The term Scrofula [from *Scrofa* = a sow; because swine were supposed to be especially subject to swellings in the neck] is employed to designate an idiopathic constitutional or blood disease; which may result either in the formation of tubercle, or in some specific form of inflammation or ulceration. The condition of system that lies at the root of these varieties of one widely prevalent disease is commonly spoken of as the scrofulous, strumous, or tuberculous diathesis. Hitherto, in the reports of the Registrar-General the tubercular order of diseases has included scrofula, tabes mesenterica, phthisis, and hydrocephalus.* A more clear and scientific arrangement is made in the "Provisional Nomenclature of Diseases" adopted by the Royal College of Physicians of London. According to this there are two varieties of scrofula to be considered: (1.) Scrofula with tubercle. (2.) Scrofula without tubercle.

1. SCROFULA WITH TUBERCLE.—Scrofulous diseases with tubercle comprehend more especially tubercular meningitis, tubercular pericarditis, phthisis pulmonalis, acute miliary tuberculosis, tabes mesenterica, and tubercular peritonitis. The word *tuberculosis* [from *Tuberculum*, dim. of *Tuber* = a knob or excrescence], had better be used to designate the production of tubercle; while by *scrofulosis* should be meant that deteriorated constitutional condition which is the fountain-head of local tuberculous manifestations. These manifestations consist in the growth of the peculiar substance, named *tubercle*, in the tissue of the arachnoid, or pleura, or pericardium, or peritoneum; in the lymphatic glands, particularly the mesenteric; and in the textures of the lung, spleen, liver, or kidney. In 1317 cases of tuberculous disease examined by Willigk, the following was the order of frequency in which various organs were found affected: Lungs, intestines, mesenteric glands, larynx, lymphatic glands, peritoneum, spleen, kidneys, pleura, liver, air-passages, bones, genital organs, brain, cerebral

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* The deaths from all causes in England and Wales for the year 1866, with an estimated population of 21,210,020, were 500,689: of which number considerably more than one-seventh happened from scrofulous affections in one form or other. Thus there died of—

Scrofula,	2,901	72,425	The Tubercular *Order* of the Constitutional *Class* of Diseases.
Tabes Mesenterica,	6,377		
Phthisis,	55,714		
Hydrocephalus,	7,433		

This number, it must be noticed, is quite independent of 77,249 deaths from other disorders of the lungs, pleuræ, bronchi, or larynx; some of which are not unlikely to have been more or less closely connected with the strumous cachexia.

membranes, urinary passages, pericardium, stomach, bowels, skin, muscles, tongue, pharynx, œsophagus, pancreas, and heart.

Owing to the frequency of tubercular disease in the lungs, and the marked degree of wasting with which it is attended, the expressions pulmonary tuberculosis, tubercular disease of the lung, phthisis, and consumption, have usually been regarded as synonymous. Greater precision, however, has now become necessary. By and by I shall define phthisis, or pulmonary consumption, as a disease of the lungs which is characterized at first by condensation, and subsequently by degeneration and softening and excavation, of more or less extensive portions of pulmonary tissue; these local changes being accompanied by such general results of imperfect nutrition as loss of flesh and strength, with a gradually increasing tendency to death. The disease is not necessarily connected with the formation of tubercle. The consolidation and softening are often tubercular, without doubt; but they may also be the consequence of some form of inflammation and condensation (chronic pneumonia, ulceration, simple abscess, &c.) of the pulmonary structure. In short, the word phthisis can be conveniently employed as the general designation for a condition of the lungs and system which arises from three or four different diseases; just as it is expedient to use the expression dyspepsia to indicate the prominent symptom of several dissimilar conditions of the stomach attended with one like result.

The peculiar substance whose presence constitutes tubercular disease is found in two forms, as gray, or miliary, or true tubercle; and as yellow or crude tubercle. The *gray* tubercles are tough, soft, compressible, and semi-transparent; and by the microscope are seen to be composed of minute irregular-shaped bodies, with hyaline basis or connecting substance. The resemblance they bear to millet-seeds leads to their being spoken of as miliary tubercles. The *yellow* tubercle is found in larger masses, presenting an opaque cheesy appearance. It is now generally believed that these two varieties merely represent different stages of the same substance, the gray being sooner or later converted into the yellow deposit. The change is supposed to be due to fatty degeneration, the oil or fat communicating the yellow color. With more favorable cases the gray, instead of retrograding into yellow tubercle, becomes dry and dense and shrivelled into a contracted fibrous-like mass. Occasionally this latter change is associated with calcareous degeneration. Although most of the cheesy matter found in disease is of a tubercular nature, yet all does not possess this character. It may be a product of pneumonia, or a syphilitic deposit, or a result of embolism, or of suppuration.

Of course there has been a vast amount of speculation as to the mode of formation and nature of tubercle. One class of pathologists maintains that this substance is only a retrograde metamorphosis of pre-existing structures, tissue elements, or morbid products. According to Virchow, tubercle is a degenerative cell proliferation—the proliferation of badly nourished connective-tissue cells. There is a complete correspondence between the corpuscles of tubercle and those of the lymphatic glands. Hence, tubercle is defined as a growth resembling lymphatic structure; that is to say, it must be classed among the lymph tumors or those which are constructed after the pattern of lymph glands, and which stand in close relation to connective-tissue formations. Another explanation, and that to which several authorities (Rokitansky, Lebert, Ancell, and Hughes Bennett) subscribe, is that tubercle consists of an exudation of the liquor sanguinis, presenting marked differences from the simple or inflammatory exudation on the one hand, and the cancerous exudation on the other. As the blood is dependent for its constitution on the results of the primary digestion in the alimentary

canal, on the secondary digestion in the tissues, and on the healthy performance of the function of respiration, so it is argued by Dr. Bennett that the causes of the tubercular exudation are to be sought in the circumstances which operate on, or influence those results: "The successive changes which occur for the purposes of assimilation in the healthy economy may be shortly enumerated as follows: 1st. Introduction into the stomach and alimentary canal of organic matter. 2d. Its transformation by the process of digestion into albuminous and oily compounds; this process is chemical. 3d. The imbibition of these through the mucous membrane in a fluid state, and their union in the termini of the villi and lacteals to form elementary molecules; this process is physical. 4th. The transformation of these, first, into chyle-corpuscles, and, secondly, into those of the blood, through the agency of the lymphatic glandular system; which is a vital process. It is from this fluid, still further elaborated in numerous ways, that the nutritive materials of the tissues are derived, so that it must be evident if the first steps of the process are imperfectly performed, the subsequent ones must also be interfered with. Hence we can readily comprehend how an improper quantity or quality of food, by diminishing the number of the elementary nutritive molecules, must impede nutrition."*

From the chemical analysis of tubercle, it appears to consist of animal matter and earthy salts; the former being principally albumen and cholesterin, while the latter consist chiefly of insoluble phosphate and carbonate of lime, with the soluble salts of soda. The precise nature of the change in the blood which occurs in tubercular disease is unknown; but it would seem that the aqueous part is increased in proportion to the solids, while the red corpuscles are especially diminished. Tubercle has a low and feeble vitality, having a tendency to pass into early decay (molecular death); this being apparently caused by the density of the tubercular growth and the mutual pressure of its particles, but especially by its occluding the capillary vessels within its sphere of action, so that it is essentially bloodless. As it goes on to break up or soften, so it manifests a tendency to cause its expulsion by inducing disorganization and ulceration of the tissues involved in its growth. Where each group of tubercles softens, an excavation or cavity is formed. The destructive or ulcerative tendency may, however, be sometimes checked, as is proved by the occasional detection in the deadhouse of lungs marked with cicatrices. The testimony of Laennec, Carswell, Bennett, and Sir James Clark, also goes to confirm the truth of this observation; and although I have heard physicians of repute state that they have never cured a case of consumption, yet I am sure that a considerable number of cases now recover after well-directed treatment. There are three ways in which it is probable that a cure may result—either by the conversion of the tubercular matter into a cretaceous or calcareous substance; or by the expectoration of the exudation, the collapse of the ulcerated walls, and the cicatrization of the cavity; or by the ulcerated walls becoming covered with a false membrane, and forming a chronic cavity. In any case it is of course inferred that the blood is rendered healthy, and consequently that the production of tubercle is stopped.

A necropsy of a tubercular patient is seldom made without finding fatty degeneration of the liver, kidneys, or arteries; but whether these degenerations stand in the relation of secondary dependence upon the tubercle-forming diathesis is uncertain.

Since the year 1865, when M. Villemin's experiments on the *inoculation*

* On the Pathology and Treatment of Pulmonary Consumption. By John Hughes Bennett, M.D., &c. Second Edition, p. 33. Edinburgh, 1859.

of tubercle were laid before the French Academy of Sciences, much attention has been paid to the artificial production of tubercular disease in animals. This pathologist experimented on rabbits; taking them in pairs, inoculating one by placing portions of fresh tubercle under the skin, and leaving the other alone. Both being then kept under exactly the same conditions, the inoculated rabbit was found after a certain time to be tuberculous, while the other animal continued healthy. However often repeated, the results were the same. Other experimenters came forward, including Lebert, and confirmed them. M. Villemin also experimented on rabbits with the materials of carbuncle, phlegmonous abscess, cancer, cholera stools, and typhoid lymph; but in no case did the same effects follow as with the matter of tubercle. Then, during 1867, Mr. Simon laid before the Pathological Society several specimens of tubercular disease in rabbits, the product of inoculation with tuberculous matter. About the same time, a paper was read on this subject at the Royal Medical and Chirurgical Society by Dr. William Marcet. This gentleman's experiments appear to have been conducted partly to show, that in inoculation we possess another means of diagnosis. His conclusions are as follows: (1.) The inoculation of guinea-pigs with the expectorations of patients suffering from phthisis, will in a certain stage of the disease, and possibly throughout, give rise to the formation of tubercles in the operated animals. (2.) If two or more guinea-pigs inoculated with human expectorations brought up by coughing should die from tubercular disease, or on being killed at least thirty days after inoculation should exhibit tubercles, this may be considered as a direct and positive evidence that the person whose expectorations were inoculated was suffering at the time from tubercular phthisis. (3.) If two or more guinea-pigs be inoculated with the expectorations of a person in the third stage of phthisis, and if these animals do not die of tubercular disease, or exhibit any tubercles when killed fifty days after inoculation, it may be considered that the softening of tubercles and the secretion from the pulmonary cavities are arrested; and consequently that the patient is in a fair way of recovery. (4.) Other materials besides the pulmonary expectorations taken from the human body in certain stages of phthisis, as blood and pus, appear to be also possessed of the power of causing the formation of tubercles in guinea-pigs, when inoculated to these animals. (5.) The spleen appears to be the first, and the lungs one of the last organs, in guinea-pigs to be attacked with tubercular disease.

The discussions which followed the publication of the foregoing principles have led to the subject being investigated by Dr. Andrew Clark, Dr. Sanderson, and Dr. Wilson Fox. And briefly stated the result comes to this,—that the inoculation of the rodentia with other materials than tubercle will render the animals tuberculous. In the experiments of Dr. Wilson Fox, 117 guinea-pigs and 12 rabbits were inoculated with various materials. Of the 117 guinea-pigs 58 proved tubercular; 6 were doubtful; and 53 failed. Those cases were only reckoned as successful in which three of the following organs were shown to be affected, viz., the lungs, bronchial glands, liver, spleen, peritoneum, intestines, or lymphatic glands. The animals had all been kept under conditions as natural as possible, and had been well fed and attended to. The most common effect was the production of cheesy matter, usually encapsuled under the skin; the next change was an enlargement of the lymphatic glands in the neighborhood of the inoculation, the glands showing on section scattered lines and streaks of cheesy degeneration; the lungs were the organs next most frequently affected; and then the bronchial glands. In all the cases, the growth was one resembling lymphatic structure, consisting of masses of round cells or nuclei imbedded

in a homogeneous tissue. Supposing these experiments are satisfactory, th opinion of Villemin and his followers that tubercle is a specific growth producible by itself alone, will have to be abandoned. During Dr. For experiments it was found, that pieces of thread charged with vaccine lymp simple setons, portions of putrid muscle, pus from various sources, sput &c., gave rise to the usual constitutional symptoms of tubercular affection as well as to growths not distinguishable from tubercle.* Some of the sul stances proved more powerful in producing this material than others; nor being more potent than the material of indisputable tubercle and the s called tubercular pneumonias.

The *causes* which have been most frequently assigned for tuberculosis a hereditary influence, syphilis, debauchery, bad air, improper food, and cold damp atmosphere. As regards hereditary influence, it may be notic that if by this is meant that there is a certain poison or strumous vir transmitted from parents to children, the position is hardly tenable; bu on the other hand, if it be only understood that the children of tuberculo parents are more liable to have the disease developed in them on the app cation of the exciting causes than the children of healthy parents, as w the opinion of John Hunter, the position is most probably true. That is not contagious seems to me certain; notwithstanding that even now son few practitioners in all countries, and many of the common people in t southern parts of Europe, entertain a contrary opinion. The question to contagion has always been brought forward at intervals, since the tin when Aretæus taught that there was a risk in conversing face to face wi a scrofulous subject. And now it is again exciting attention; chiefly consequence of the bare hypothesis submitted to the profession by Dr. W

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* These results are curious when compared with the views of some authors note on the effects of inoculation with variolous matter and vaccine lymph. As evidence, at the threshold of this important inquiry, is deserving of attention, I nc the following references. In doing this, I am merely helping to collect materi which are to be sifted. The data are much too scanty for any conclusions to drawn.

Dr. John Fordyce, when giving an account of the virtues of Peruvian bark scrofulous cases (Medical Observations and Inquiries, by a Society of Physicians London, 4th edition, vol. i, p. 184, London, 1776), cites the history of a young lad 16 years old, who was inoculated for the small-pox. This proved of a favoral kind, and she soon recovered; but "for some weeks after had a few troublesor sores near the places where she had been inoculated, during which time, althou she often took physic, a great part of the right parotid swelled considerably, as w as the glands on each side of the neck." In a few weeks the sores healed, and t swelling disappeared, under treatment.—Again, Dr. W. Rowley (Seventy-four Sel Cases, &c., 2d edition, p. 47, London, 1779) says: "I have seen several instanc where inoculation has produced the King's evil; therefore we should be very ca tious what subject we take the matter from." He mentions one case apparent in support of this view. Antonio De Haen, a great opponent of inoculation, t lieved that inoculated small-pox was a frequent cause of scrofula. (Opuscula omr medico-physica. Tom. iii, De methodo inoculandi variolas, &c, Neapoli, 177 And lastly, Barthez and Rilliet (Traité des Maladies des Enfants, deuxième éditic tome troisième, p. 399, Paris, 1854) have expressed their opinion that vaccinat children are more disposed to tuberculosis than the non-vaccinated. Thus of 2 vaccinated children, 138 died tuberculous, and 70 non-tubercular. Of 95 non-vac nated children, 30 were tubercular and 65 not so. As the conclusions of Mess Barthez and Rilliet with regard to the significance of these figures do not seem ve clear, it will be better to give their own words: "Nous ne regardons nullement vaccine comme une cause de tubercules; car jamais nous n'avons vu l'affecti chronique lui succéder immédiatement; nous constatons seulement que les enfa vaccinés meurent plus souvent tuberculeux que non tuberculeux, et que le contra a lieu pour les enfants non vaccinés. Nous en concluons que la vaccine favorise t probablement la prédisposition aux tubercules." (p. 400.)

liam Budd, in October, 1867, that tubercular consumption is a true zymotic disease, due to "a specific morbific matter," which is propagated from one person to another, and so disseminated through society. But with all deference I must say, that nothing which I have observed leads me to agree with Dr. Budd. Indeed, that tubercle is a disease of a specific nature, in the same sense as typhoid fever, scarlet fever, typhus, syphilis, &c., appears to be one of the most untenable propositions which could have been started. Whether this opinion will have to be modified by Dr. W. Budd's explanations (none having as yet been given) remains to be seen. Many authors have imagined that a syphilitic taint in either parent will induce tuberculosis in their offspring; while some have even maintained that this disease is only a degenerated species of syphilis. There may be said, however, to be but little truth in either of these suppositions; tubercular affections and syphilis being very different diseases, quite independent the one of the other. Neither does the development of tubercle appear to be influenced by climate or temperature; the inhabitants of the tropics and of the Arctic regions are sufferers from it. But it is to diseased nutrition, however brought about, that we may refer the production of scrofulosis and tuberculosis. And it is to insufficient, innutritious, or improper food, that the vast majority of cases of diseased nutrition are due; though it will also arise from almost constantly breathing a vitiated atmosphere, from long-continued sorrow and mental depression, or from want of cleanliness and healthy exercise.*

The *symptoms* which precede the occurrence of tuberculosis are generally indicative of disorder of the digestive organs. Dr. Wilson Philip first

* A most singular narrative, confirmatory of these views, has been given by Laennec. It runs thus: "I had under my own eyes, during a period of ten years, a striking example of the effect of the depressing passions in producing phthisis, in the case of a religious association of women, of recent foundation, and which never obtained from the ecclesiastical authorities any other than a provisional toleration, on account of the extreme severity of its rules. The diet of these persons was certainly very austere, yet it was by no means beyond what nature could bear. But the ascetic spirit which regulated their minds was such as to give rise to consequences no less serious than surprising. Not only was the attention of these women habitually fixed on the most terrible truths of religion, but it was the constant practice to try them by every kind of contrariety and opposition, in order to bring them, as soon as possible, to an entire renouncement of their own proper will. The consequences of this discipline were the same in all; after being one or two months in the establishment, the catamenia became suppressed; and in the course of one or two months thereafter, phthisis declared itself! As no vow was taken in this society, I endeavored to prevail upon the patients to leave the house as soon as the consumptive symptoms began to appear; and almost all those who followed my advice were cured, although several of them exhibited well-marked indications of the disease. During the ten years that I was physician of this association, I witnessed its entire renovation two or three different times, owing to the successive loss of all its members, with the exception of a small number, consisting chiefly of the superior, the gate-keeper, and the sisters who had charge of the garden, kitchen, and infirmary. It will be observed, that these individuals were those who had the most constant distractions from their religious tasks, and that they also went out pretty often to the city, on business connected with the establishment. In like manner, in other situations, it has appeared to me that almost all those who became phthisical, without being constitutionally predisposed to the disease, might attribute the origin of their complaint to grief, either very deep or of long continuance."—A Treatise on Diseases of the Chest and on Mediate Auscultation, by R. T. H. Laennec, M.D. Translated from the French by John Forbes, M.D., &c. Fourth Edition, p. 303. London, 1834.

The following evidence on this head is also deserving of attention, more especially as it may be feared that there is a tendency in the present day unduly to increase the severity of prison discipline. "In all parts of Europe," says Dr. Baly, formerly physician to the Millbank Penitentiary, "the proportion of deaths has been

noticed that there were some forms of indigestion which ended in phth and it has more recently been proved by Mr. Jonathan Hutchinson others, that the peculiar feature of this dyspepsia consists in the dif assimilation of fatty matters. Sugar and fat and even alcohol "turn a giving rise to sour eructations and heartburn and flatulence. Beside important warning, it is stated by many authorities that persons posse the strumous diathesis manifest certain peculiarities. The chief of are,—a coldness of the body and extremities; a dull white, but very cate skin; and a rounded graceful outline of the face, with a delica feature and rosy hue of the cheeks, strongly contrasting with the surr ing pallor, and giving to the countenance, especially in women, a ch teristic beauty. The hair is also said to be usually blonde or aut while the eyes are large and blue, projecting and humid, with the p habitually dilated, and the sclerotics of a pearly whiteness. The eyel are long, unless they have been destroyed by that inflammatory a which causes swelling and eversion of the edges of the eyelid, and v is known as ophthalmia tarsi. Moreover, scrofulous subjects are th to be remarkable for the development of the head, of the alæ nasi, a the upper lip, as also for the large size of the lower jaw, and the milk- teeth, which early become carious. It is asserted too that the bre habitually sour and fetid; the neck being long and rounded, the narrow and flat, the shoulders high, the abdomen large and prominen limbs thin, and the flesh soft and flabby. The opinion is very comm entertained, that in youth all such persons manifest great cerebral acti that they are impatient and passionate; that their intellectual syst largely developed; and that although many have more imagination judgment, yet a few are profound and capable of sustained mental tion. There are not many cases, however, where the actual appear will correspond with this description. The most constant peculiariti the paleness and coldness of the body and the tumidity of the abdom

Tubercular diseases may set in at any period of life, though the peculiarly the affections of childhood and youth. Perhaps the liabil them is greatest from three to fifteen, and from eighteen to thirty-f forty. Their development is favored by all conditions which tend t der the blood unhealthy; such as malformations of the chest, defi structure of the lungs, a small heart, diseased nutrition, continued an and grief, sexual excesses, &c. When these causes act upon a frame l itarily predisposed, the disease is almost sure to be developed; bu not certain, though it is very probable, that they can give rise to it there is no such predisposition.

Tubercular diseases are not only preceded but are frequently acc nied by a disordered state of the primæ viæ,—such as "biliousness," eructations, flatulence, irregular action of the bowels with pale and like evacuations, a distaste for fatty food, and a generally bad app conditions which are so constant that some authors speak of them a *mous dyspepsia*. Then we find paleness and puffiness of the face, swelling of the lips and nostrils, and purulent discharges from the

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much greater among criminals in prisons than amongst persons of a corresp class out of prison; and the increased mortality is due to various forms of sc and especially tubercular phthisis. The causes which contribute to this res cold, poorness of diet, deficient ventilation, want of sufficient bodily exercis dejection of mind. In a great number of cases of phthisis in this prison, appa hopeless, the disease was immediately checked on the release of the prisoners, of whom entirely recovered." Quoted from Dr. William Addison, on Healt Diseased Structure, p. 48. London, 1849.

vesicular eruptions about the head; enlargement of the glands of the neck and of the tonsils; disagreeable exhalations from the skin, especially of the feet and axillæ; feebleness and rapidity of the pulse; together with weakness and progressive loss of weight. The muscles are soft and flabby; the mucous membranes are irritable, and apt to become spotted at parts with aphthæ; the nervous susceptibility increases; the sleep is seldom sound; the physical powers decline; and the force of the circulation diminishes, so that there is coldness of the extremities. Moreover, together with a diminished power of maintaining the animal heat, there is general uneasiness or irritability, with a susceptibility to attacks of simple fever. As the disorder progresses, so all those symptoms which arise from depraved or impoverished blood, and from enfeebled vital energies, are strongly manifested. In women, the catamenia become irregular or entirely cease.

The *temperature of the body*, as taken by the thermometer kept in the axilla for five minutes, is found to be continuously raised above the normal standard in all cases while the production of tubercle is going on, quite independently of the organ affected. This elevation often reaches 103° or 105° Fahr.; while it sometimes does so before any evidence can be obtained of local disease. As a rule, the higher the temperature is raised, the greater is the severity of the constitutional disease, and the greater is the amount of tubercle produced. On the other hand, as the formation of tubercle ceases, so the temperature falls towards the normal standard. This standard may be said to be 98°, a variation of two or three-tenths of a degree above or below this, being of little or no moment.

It is a matter of common observation that many tuberculous patients, while daily losing flesh and strength, are yet very sanguine in expecting recovery; though unfortunately they generally imagine a cure is to be effected without any great exertion on their own parts. Perhaps there is no other critical disease where it is more important to impress upon the sufferer the absolute necessity for steady perseverance in the use of remedies; and the hopelessness of giving way to that want of energy and determination, which many try to excuse by the expression of their devout desire to "trust in Providence."

Remembering what has been said upon the hereditary nature of tuberculosis it should be noticed, that there are three points to be particularly attended to in order to prevent its transmission. These are,—(1.) To obtain well-assorted marriages—the marriages of parties in sound health and vigor, and not related by blood to each other. (2.) Where this disease exists in the parents, or in either of them, great care must be taken to maintain the health of the mother during the period of utero-gestation. She should wear warm clothing, take regular exercise in the open air, avoid heated rooms and late hours, sleep in a large room, and have a plain nourishing diet. (3.) On the birth of the child, every means ought to be taken to strengthen its general health, and to counteract the hereditary influence, by attention to the food, air, clothing, &c. If the mother be free from the strumous habit, she may suckle her offspring, but otherwise a young and healthy nurse should do so. At the age of nine or ten months the infant ought to be weaned and fed on cow's or goat's milk, a small quantity of light nutritious vegetables, and a little good broth. Dr. Paris strongly recommended milk impregnated with the fat of mutton suet, which he ordered to be prepared by inclosing the suet in a muslin bag, and then simmering it with the milk. The child must be clothed in flannel; should live in apartments which are well ventilated and well lighted; ought to have plenty of exercise in the open air; and once daily should have a cold sea-water bath, or a tepid bath with bay salt dissolved in it. Ill-arranged,

badly drained, close-smelling, damp houses must be avoided; as well as all those localities which are generally regarded as unhealthy.

The regulation of the food and occupation and residence of those adults who have any tendency, hereditary or acquired, to tubercular disease, ought never to be neglected. The necessary rules which the physician should lay down for the guidance of such persons will be obvious from a consideration of the concluding remarks of this section. The normal vigor of life not only depends on the healthy condition of the nervous centres, the heart, the lungs, and the digestive system; but it can only be maintained by all these organs acting harmoniously in a properly developed frame. Consequently where one system is weak, judicious attempts must be made to strengthen it. The remarkable change which can be wrought by a course of physical training will often prove very beneficial, provided the amount of exertion gone through is suited to the age and strength of the individual. This amount ought to vary not only in proportion to the soundness of the lungs and heart, &c., but also in relation to the development of the whole body. A perfectly healthy man should have, as a rule, a certain weight in proportion to his height and age, although it is difficult to say exactly what this weight should be. Some rough conclusions, at least, can be drawn from the table by Dr. Hutchinson in the chapter on tubercular phthisis, as well as from the following. This exhibits the relative growth of the human body (males) in height and weight, from eighteen to thirty years of age. It has been constructed by Mr. J. T. Dawson from observations upon 4800 prisoners at the Borough Jail of Liverpool.

	HEIGHT.						WEIGHT.					
Age.	Average.		Maximum.		Minimum.		Average.		Maximum.		Minimum.	
	ft.	in.	ft.	in.	ft.	in.	st.	lbs.	st.	lbs.	st.	lbs.
18	5	4.34	5	11	4	10½	8	10.79	10	10	6	6
19	5	4.94	5	11½	4	11	9	4.11	12	8	7	4
20	5	5.11	5	11	5	1	9	5.58	12	8	7	13
21	5	5.57	5	11¼	5	0½	9	5.02	12	0	7	3
22	5	6.17	6	1	5	0¼	9	12.41	13	2	7	0
23	5	6.17	6	1	4	11	10	2.95	12	12	7	12
24	5	5.94	6	1	4	9	10	2.	12	12	7	12
25	5	6.30	6	0	4	11	10	5.65	13	8	8	2
26	5	6.28	6	1¾	4	9½	10	1.06	13	8	6	12
27	5	6.38	5	11¾	5	1	10	4.75	13	10	7	12
28	5	6.65	6	1	5	1	10	2.62	13	2	7	7
29	5	7.02	6	0½	5	1¼	10	5.53	13	12	8	4
30	5	6.36	6	1	5	0¾	10	1.55	14	1	8	1

An examination of this table shows that the results do not indicate a progressive increase in height or weight. For instance, with regard to height, Mr. Dawson remarks: "The average height of 185 men at 24, is less than that of 200 men at 23, and 100 at 26 give a lower average than 200 at 25; while 100 at 30 give a lower average than 95 at 29."* Still these are the best results at present available. And my object in quoting them will be attained, if I succeed in leading the practitioner to pay that attention to the subject which is necessary; so that when he finds a decided disproportion between the age and height and weight of a patient, he may not rest satisfied until he has discovered the cause of such misrelation.

* Journal of the Statistical Society of London, vol. xxv, p. 24. London, 1862.

With regard to the disease under consideration, the question is very important; since one of the most constant, as well as one of the earliest, results of the deposit of tubercle is a steady and progressive loss of weight.

For remarks on the *treatment* of scrofula with tubercle, the reader must refer to the directions which are given in the sections on phthisis, hydrocephalus, tabes mesenterica, &c. But it may be summarily stated that the object always to be kept in view is to improve the faulty nutrition, so as to promote the formation of healthy blood, and thus prevent the fresh production of tubercle; while we also endeavor to favor the absorption of that which has been formed. These indications will be best carried out by the use of a diet containing as much properly cooked animal food, milk or cream, and raw eggs, as can be assimilated; by the long-continued employment of cod-liver oil; as well as by the exhibition of drugs which check undue acidity when it prevails, and which will aid digestion where this function is imperfectly performed. The utility of such special remedies as bark, preparations of steel, the alkaline hypophosphites, iodine, topical counter-irritants, change of climate, &c., will all be dwelt upon by and by. Suffice it to add here that the tuberculous patient ought never to be allowed to breathe air which is in the slightest degree impure; that outdoor exercise, on foot and on horseback and in an open carriage, is of the greatest importance to him; that his clothing is to be such as will protect the body from changes in temperature, flannel being worn next the skin throughout the year, with the addition of a chamois-leather jacket over the flannel vest during cold weather; that the functions of his skin are to be maintained by bathing in water of a suitable temperature, followed by friction; and that he should devote eight or ten hours out of every twenty-four to sleep, on a horse-hair mattress, in a warm and dry and properly ventilated room.

2. **SCROFULA WITHOUT TUBERCLE.**—Scrofula, or external scrofula, or struma, or tabes glandularis, or king's evil, manifests itself chiefly by glandular swellings, more or less extensive ulcerations, and indolent abscesses. Cases of scrofulous ophthalmia are very far from uncommon; while the same must be said of strumous diseases of the bones and joints.

Inflammation of the lymphatic glands—strumous adenitis—is one of the most frequent consequences of the scrofulous habit. The glands of the neck, and those about the base and angle of the lower jaw, are more frequently affected than any others. The subjects of this form of morbid action are especially young children, although it is not a rare affection of strumous adults. There are rarely any premonitory symptoms to attract notice; the first indication of the disease being an indolent swelling of one or more glands without marked constitutional disturbance. The enlargement often remains stationary for months or even years; but if from any cause the mischief suddenly increase, and especially if a tendency to suppuration become manifested, then the system suffers considerably. The already unhealthy patient becomes irritable and restless, a low kind of fever is set up, the tongue gets furred, the bowels are costive, and the appetite fails, while the urine is found scanty, and loaded with urates. Unhealthy discharges also often take place from the ears, nose, and eyes, while in female children there is frequently a troublesome form of vaginal leucorrhœa. Where the general health is already very bad, or when it gradually becomes so, the inflamed glands rapidly undergo disorganization, the surrounding skin and connective tissue becoming involved, and extensive indolent ulcerations resulting. The site of these ulcers, when they have healed, is ever afterwards indicated by unsightly cicatrices.

The constitutional treatment of these cases is much the same as that

required in the early stages of scrofula with tubercle. Nutritious food, cleanliness, and residence in pure air, are the requisite measures. Hence we prescribe mutton and beef, potatoes and watercresses, raw eggs, milk and cream, cod-liver oil, warm or tepid or cold baths, and sea air. Iodine in different forms is often given—iodide of potassium, iodide of ammonium, iodide of iron; but as a rule I have more confidence in quinine and iron, chlorate of potash with bark, arsenic and steel (F. 399), and chemical food (F. 405). Locally, benefit now and then arises from the use of the officinal iodine liniment, or from the ointment of iodide of lead, or that of iodide of cadmium, or that of red iodide of mercury diluted with an equal proportion of lard. It has been suggested that these enlarged glands can often be dissected out with advantage; but I have had no experience of this practice. When suppuration takes place, the treatment will have to be the same as for an abscess.

Scrofulous ulcers are a common indication of the cachexia under consideration. They are more often seated about the neck, shoulders, arms, or hips, than elsewhere. By their gradual extension, extensive tracts of skin may be destroyed. The efforts at repair are always slow and imperfect, for if any granulations appear they are sure to be exuberant and flabby, while the subjacent tissue is boggy and readily broken down by pressure with a probe. The general health, bad from the beginning, daily deteriorates. The only hope of cure is from the constitutional treatment just recommended. Cicatrization is sometimes procured after destruction of the unhealthy tissue by strong caustics—such as nitric acid, or potassa fusa. A lotion of carbolic acid (ten grains of crystals to each ounce of water) can be recommended.

Strumous abscesses often commence insidiously in the connective tissue, or they have their origin in the suppuration which repeatedly follows glandular inflammation. They are apt to become indolent, or they suppurate imperfectly, or they burrow deeply in all directions. Hence, long sinuses are formed, from which there exudes a thin sanious pus. Although hasty interference is to be deprecated, yet frequently these abscesses have to be opened with the knife. This is advisable, partly because their cure will be thus expedited, but chiefly for the reason that the linear cicatrix which results is less disfiguring than the rough and irregular scar that follows from allowing the skin to ulcerate. Moreover, by a neglect of this advice, when the abscess has occurred over one of the long bones, such as the shaft of the tibia, periostitis and necrosis have occurred.

Strumous ophthalmia occurs in children between the time of weaning and the end of the ninth or tenth year. Its chief symptoms consist of slight conjunctival and sclerotic redness; with the formation of little phlyctenulæ or pustules, and often of ulcers, on the cornea. There is a copious lachrymal secretion; with irritability of the nasal and buccal mucous membranes. The great intolerance of light (photophobia) is almost a pathognomonic feature. It causes spasmodic contraction of the eyelids; and makes the child hide its head, or sit in a dark corner, or shade the eyes with a handkerchief. Both eyes are usually affected. In addition, there are swellings of the lips, eruptions behind and within the ears, as well as disordered intestinal secretions. The hot tears while they flow over the cheek, set up irritation; a troublesome eczematous rash often resulting.

The management of these cases will tax the skill and vigilance of the nurse as well as of the doctor. The absolute necessity for constitutional treatment need not be again insisted on. Great attention must be paid to cleanliness. Warm bathing of the eyes, and fomentations, are very ser-

viceable. A drop or two of wine of opium may be placed in each eye night and morning; or sulphate of zinc or alum collyria (F. 291) can sometimes be advantageously prescribed. Frequently, however, sedative applications (F. 290) are more serviceable. The application of spermaceti ointment to the edges of the eyelids at night is necessary, to prevent their becoming agglutinated. In obstinate cases small flying blisters to the temples, or behind the ears, should be ordered. It is remarkable sometimes to witness the rapidity with which the eyes improve as discharges are established from the skin at the back of the ears. In the house, also, a green shade ought to be worn; while out of doors a gray or blue veil is absolutely necessary.

Caries, or ulceration of bone, due to scrofula, has no particular features distinguishing it from that produced by other causes. The liability to it, however, should not be forgotten; while care ought to be taken not to mistake its early symptoms for those of rheumatism.

XIV. RICKETS.

Rickets, or rachitis, or rhachitis, or osteomalacia infantum, is a constitutional disease; being characterized by a softening of the bones, superadded to many of those conditions that result from impaired assimilation. There is general debility, flaccidity of the muscles, and a sluggish state of the nervous system. Owing to the diminution of the earthy matter in the bones, the form of different parts of the skeleton gets much altered. This alteration is possibly caused by the action of the muscles, but more probably it arises in consequence of the limbs bending under their own weight or under that of the body. The long bones are usually most affected; their shafts being curved, and their cancellous extremities thickened. There is frequently also that peculiar condition of the spleen and lymphatic glands known as amyloid or albuminoid degeneration; the liver being likewise many times found similarly affected.

The disease is essentially one of early childhood: it is very rarely congenital: it has no direct relationship with scrofula, or cancer, or syphilis. The cachexia usually becomes first apparent between the sixth and the twelfth month after birth. Whether there is any essential identity between the rickets of childhood and the mollities ossium of adults is uncertain. My own belief is that these osseous degenerations are, to say the least, very closely allied. The important peculiarity which is relied upon as showing a distinction between rickets and mollities ossium, viz., that the former is remediable, while no treatment checks the latter from running into a state of fatal fatty degeneration, seems to admit of explanation. During childhood the development and growth of the bones are amongst the most important of the processes which are carried on in the system. While this development is going on, it surely can easily be influenced; that is to say, it may be checked, or retarded, or urged on in an abnormal course. But when ossification is complete, then alterations either in a right or wrong direction are made with much more difficulty. Structural disease if thoroughly established is perpetuated; while it much more easily runs on to fatty degeneration than does similar disease in childhood.

Causes.—Anything which induces imperfect assimilation of food and impaired nutrition of the body may act as a cause of rickets. Hence, this

affection is sometimes met with in such weakly children of wealthy parents as suffer from defective action of the vital forces. Like scrofula, however, it is essentially a disease of the poorer classes. Insufficient, and especially improper food; the constant respiration of foul, impure air; residence in damp, dark, cold, or filthy dwellings: these and all similar circumstances, readily serve, in all probability, to generate rickets. Again, the children of parents who have weakened themselves by sexual excesses, or who have married too early or much too late in life; or of those whose constitutions have been impaired by syphilis, or by a strumous taint, or by unhealthy occupations; as well as the offspring of delicate anæmic mothers: all such children are, doubtless, predisposed to this disease. I do not mean by this that rickets is hereditary; but merely that the health of the parents has an effect on the health of the child, so that if the former be bad the latter will be disposed to quickly fail when the exciting causes of disease are brought into action.

M. Guérin, from numerous experiments on animals, has proved the possibility of inducing artificial "rickets" at will, by merely separating the young too early from their mothers, and supplying them with food suitable only for the adult. There is no question that in these cases of improper feeding partial starvation is induced, both by the imperfect assimilation of the food, and by the diminution of digestive power which is brought about. That the same result can be produced in the human subject by the same means no one who attends the hospital out-patient room will doubt. The infant mortality in Lancashire has long been excessively high, the occupations of the poorer women causing them to neglect their children. During the cotton famine (1862–63), this mortality was greatly diminished; for the mothers being unemployed had plenty of time to attend to the feeding of their offspring, while as the resources of the parents became diminished the children were not stuffed with unsuitable artificial food. And it must be remembered that excessive mortality is only a portion of the evil which care will remove. The effects of partial starvation are not simply most fatal to large numbers during infancy, but prove highly injurious by laying the foundation for future suffering in those who escape immediate death. With an ill-developed body we commonly find a weak nervous system, and consequently a low form of intelligence; so that individuals thus constituted are unable to make any stand against the first inroads of physical no less than of moral disease.

Symptoms.—The earliest indication that some morbid process is going on in the system is generally shown by languor with an occasional feverish condition of the body, sadness and irritability of the temper, copious perspirations about the head, and general tenderness of the trunk and extremities. Soon there is some swelling of the abdomen, gastro-intestinal irritation and diarrhœa, general debility and wasting, with slightly painful tumefaction of the wrists, and knees, and ankles. The transition from apparent health to disease is gradual, and occasionally only marked by the presence of slight ailment; so that the practitioner must be on his guard. Some time always elapses between the commencement of the morbid process and its certain detection. And even when the cachexia may be early recognized there is commonly an interval of several months before any deformity can be noticed.

The long bones are amongst the first to exhibit a change from the natural form; the femur bending forwards and outwards, and the tibia generally outwards—*bow-legs*. In some instances the knees bend inwards, while the feet are thrown outwards—*knock-knees*. The clavicle, humerus, radius, and ulna are always much curved, and sometimes twisted. The thoracic de-

formity is usually well marked; the back being flattened, the sternum thrust forward, and the natural curve of the ribs lessened. The child is said to be *pigeon-breasted*. The flat bones also get thickened, and there is a real (not simply an apparent) enlargement of all the extremities of the bones. Pelvic deformity is common, while the spine gets contorted in various ways; but both of these results occur at a much later period than the curving of the long bones. The head appears disproportionately large; the face becomes pale, and the features attenuated; while the eyes look unnaturally bright, and have a staring expression. The respirations are quickened; and the pulse gets frequent and feeble. The appetite is bad or capricious, and the powers of digestion much impaired. The stools are pale or slate-colored, and very offensive: perhaps the food passes through the intestines only half digested. The urinary secretion is more abundant than in health, and loaded with earthy phosphates—especially phosphate of lime; the excess being probably due to this salt being gradually drained from the osseous system. There is no doubt that all the tissues lose their tone, and become weak and flabby, as the disease progresses; though the chief signs are shown by the osseous system. Thus the bones are always found more or less soft, spongy, and pliable, owing to the diminution of their earthy constituents, particularly of the phosphate of lime. This softening of the bones may be so great that they can easily be cut or bent; but there is never that extreme softening sometimes observed in cases of mollities ossium in adults, in which there seems to remain but little of certain bones beyond a lot of greasy adipocere in a case of periosteum. On an average, in rickets, the affected osseous tissue contains two-thirds less of earthy matter than should be present. The lime salts are not only less freely taken up by the bones or periosteum, than in health, but part of those already deposited in the osseous texture are reabsorbed and excreted in the urine.

In addition to the foregoing symptoms, it has been noticed that rickety children manifest a tendency to chronic hydrocephalus; to catarrh, or bronchitis, with pulmonary collapse; to laryngismus stridulus; to urinary calculi; as well as to albuminoid infiltration of the spleen, lymphatic glands, liver, &c. Where the emaciation and anæmia are great, it will generally be found that the tissues of one or more important organs have become infiltrated with albuminoid or amyloid material. Occasionally, where death has occurred from anæmic convulsions, I believe that an albuminoid degeneration of the kidneys has been the source of the mischief. In many instances there is obstinate diarrhœa, which is probably due in part to the large amount of free acid constantly generated in the alimentary canal. This acid also often interferes with the assimilation of milk, causing this important food to be vomited or passed in the stools in the form of indigestible masses of curd.

During the last stage of the disorder the child may either slowly sink from exhaustion, or from some cerebral, or thoracic, or abdominal disease. More frequently, however, a happier result is obtained. The functions of the body are at first slowly, but afterwards rapidly, restored to a normal state. The earliest signs of improvement are, generally, a more healthy condition of the secretions and excretions, and an increase in the tone and powers of the system. As the appetite improves, the flesh becomes firmer; the languor, dulness, and febrile symptoms all subside; growth proceeds rapidly; and the tumidity of the abdomen disappears. The disease of the bones too is now arrested, and healthy osseous matter actively deposited at those parts where the weakness has been the greatest, *i. e.*, at the part where the curvature is the most marked. As the general health daily

improves, so the bones become firmer and harder; until at length only the deformities produced by the curvatures remain, to show during life how the individual has been once affected.

M. Guérin divides the term of rickets into three periods, viz.: *a*, the stage of incubation; *b*, the stage of deformation; and *c*, the stage of transition of the organs and functions to a healthy condition. Of 346 cases of rickets observed by this author,—3 had arisen before birth, 98 in the first year, 176 in the second, 35 in the third, 19 in the fourth, 10 in the fifth, and 5 in the sixth. Of these, 148 were males, and 198 females. The average period of incubation was six months, during which a marked train of deranged actions manifested themselves. The total duration of the disease is from one to two or three years, or longer.

Diagnosis.—This is sometimes difficult in the early or precursory stage, as the symptoms closely resemble those presented by scrofula in one or other of its various forms. The enlargement of the ends of the long bones, producing tumefaction of the knees, ankles, wrists, &c., serves to aid the diagnosis; while the subsequent curvature confirms it, since softening of the bones during childhood only occurs in rickets.

In almost all rickety children it will be noticed that the fontanelles close late, being found widely open instead of ossified at the end of the second year of age. The commencement of teething is also deferred; the two central temporary incisors of the lower jaw not making their appearance until between the tenth and twelfth months, instead of the beginning of the seventh. The children are also backward in walking and talking; their growth looks stunted; and their intellectual powers are below the average.

Prognosis.—When uncomplicated, a favorable result may be expected from judicious treatment; but where there is considerable deformity, together with great loss of vital power, recovery will be doubtful. The earlier during infancy that the disorder occurs, the more unfavorable is the result likely to be; inasmuch as the general cachexia is then usually very severe. About 2 per cent. of all the deaths occurring in England under 5 years of age are returned as due to rickets. This small proportion, however, must not be regarded as a proof that the danger of the disease is inconsiderable. Death directly from rickets is not common; death from its complications is frequent. Without doubt, the fatality of bronchitis, pleurisy, laryngismus stridulus, chronic hydrocephalus, infantile convulsions, diarrhœa, &c., is greatly increased by the rickety cachexia.

Treatment.—To prevent the occurrence of rickets in delicate children, or in the offspring of weakly parents, the treatment must be commenced at birth. It is usually very simple, and consists in attention to the following points. The infant is to be fed only at the breast for the first eight months of life, by the mother if she be strong and sound, by a vigorous wet-nurse if the maternal health prove indifferent. As the result of a large experience I may say positively, that I have never known a rickety child to have been properly fed during the first year of its existence. If farinaceous food be given as the infant reaches the eighth or ninth month, "Liebig's food for infants" is to be selected. About the same time good beef tea, as well as the gravy out of a joint of beef or mutton, may be allowed; followed after some weeks by the yolk of a lightly cooked egg, custard pudding, and subsequently by a little underdone mutton minced very fine or pounded in a mortar. During this period, attention is to be paid to cleanliness, and to suitable clothing; it being important that every young child should be warmly clad, and almost always with flannel next the skin. And then, the nursery ought to be healthy; care at least being taken that the nursery

is properly heated and ventilated, so that pure air may be breathed night and day.

When the cachexia is established, much can be accomplished by a well-directed course of remedies. In all instances, attempts must be made to check any complications—as catarrh, laryngismus stridulus, dyspepsia, diarrhœa, &c., that may be exhausting the system; at the same time that everything is done to strengthen the constitutional powers. Tepid chalybeate, or oak bark (F. 126), or sea-water baths, or daily sponging with salt water; pure air—especially sea or country air; good nourishing diet, with an abundance of milk; ferruginous tonics, sometimes in combination with quinine; and cod-liver oil, taken continuously for many weeks or even months: such are the remedies on which I chiefly rely. Where milk (whether of the cow, goat, or ass) cannot be digested, it should be given with lime-water, or cream can be tried; or these disagreeing, whey may be used as an inferior though still useful substitute. In bad cases I have seen benefit from the administration of restorative soup, or of raw meat simply minced (F. 2). With regard to the preparation of steel to be employed I know of none equal to Parrish's syrup of the phosphates of iron, lime, soda, and potash (F. 405). Supposing the bowels to become so constipated as to require physic, the most gentle aperients are to be ordered,—rhubarb, syrup of senna, or half a teaspoonful of castor oil in beef tea. That bane of the nursery, gray powder, is very seldom needed; while antimonial wine and all such lowering medicines are to be positively interdicted.

If, during convalescence, the child shows a marked liking for any particular kind of food, the desire should be gratified if possible. Sometimes there is a great desire for sweets, sometimes for salt, sometimes for fat and butter,—tastes which may rather be encouraged than otherwise.

Several years ago, M. Piorry stated that he had long been in the habit of administering phosphate of lime with advantage to rickety children suffering from curvature of the spinal column. He recommended it in the form of very fine filings of fresh bones; giving about one ounce daily, in milk, or in rice-milk. M. Piorry did not attribute all the improvement observed to this salt, as a highly nutritious diet was simultaneously employed. But it seemed certain that in several patients in whom the spinal column had continued to deviate more and more every year, and who were subjected during several months to good regimen, free exposure to light, a dry and warm temperature, and especially to the use of the phosphate, the progress of the affection had become completely arrested. Now it likewise appears probable that this remedy may prove useful in all forms of rickets, as well as in the osteomalacia of adults, and in women threatened with the softening of the bones during pregnancy. The insolubility of the phosphate of lime has hitherto prevented its direct administration, but it has been suggested that this objection can be removed by uniting the phosphate with carbonate of lime, when a soluble combination and valuable remedy results.

With regard to the use of irons and splints and other mechanical contrivances for supporting the legs of rickety children, several surgeons object to them, because they believe that the limbs subsequently become straight spontaneously. There seems, however, reason to doubt the correctness of this opinion, and hence I am disposed to recommend the employment of some well-fitting apparatus in many cases. I have never seen any harm arise from the patient wearing light irons for a few hours every day during attempts at walking, provided they are made with joints corresponding to the hip and knee and ankle; so that while affording effi-

tion of the tuberculated form among the patients in the hospital at Bergen, from 1840 to 1847, was between nine and ten years; of the anæsthetic form, between eighteen and nineteen years. With both varieties, but especially the non-tuberculated, the morbid action sometimes remains stationary for several years. In leprosy, as in other constitutional diseases which run their course slowly, and which are indicative of a depraved habit of body, death happens quite as frequently from some intercurrent mischief as from the original malady. Many lepers die of chronic diarrhœa or dysentery, of bronchitis or pneumonia, of nephritis, as well as of intermittent and remittent fevers and erysipelas. Occasionally, death has taken place quite suddenly, without any sufficient cause being discoverable at the autopsy. When the disease itself destroys life, it may do so by the thickening of the tissues of the glottis producing apnœa, or by hemorrhage from one or other of the ulcerations, or by convulsions and coma due to the influence of the morbid state of the blood on the nervous centres.

There is a very general belief amongst the best observers in all parts of the world that leprosy is hereditary, though it also occurs where no such influence can be traced; and that it frequently skips over one generation to reappear in the next. At the Bergen Hospital it was noticed that the hereditariness seemed to be more frequent on the maternal than on the paternal side; while it was also more diffused in the collateral than the direct line. The evidence may be said to be conclusive that it is not contagious, nor transmissible by sexual intercourse. The male sex appears to be more liable to the disease than the female; but the testimony on this head is contradictory. Very probably false deductions have been made, owing to all the facts not being known. All writers agree, however, that the lowest classes of society are the most liable to leprosy; while if it is not directly caused, it is certainly greatly aggravated and its progress hastened, by improper and insufficient food, personal uncleanliness, intemperance, and sexual excesses, as well as by residence in malarial districts or in damp and ill-ventilated dwellings. Taken generally, lepers are as filthy and degraded in their mode of life as they are miserable and destitute.

Symptoms.—The chief features of the Mosaic leprosy are described in the thirteenth chapter of Leviticus, in which will be found "the laws and tokens" whereby the priest is to be guided in discerning this dreaded affection. Here we notice (verses 24 and 25) what may be regarded as an indication of the commencement of the disease in an erythematous rash. In this respect, the same feature marks the onset of *tuberculated* leprosy in the present day. The general feverishness which occurs in all acute cases towards the end of the latent period, ushers in an erythematous eruption; on the appearance of which, the fever subsides. Where the disease makes its approach very gradually, there may be an absence of all fever. There will be one pinkish or purplish-red spot, or several; if several, they either remain isolated, or they run into patches. After a time, this rash perhaps subsides. There is an interval of freedom; followed; however, by another attack of fever and a fresh eruption, more severe and extensive than the first. This suspension of morbid action and aggravated redevelopment may possibly occur several times. At length, the serous portion of the blood escapes into the intervascular tissues at the site of the exanthematous spots; giving rise to hard and semi-transparent elevations or tubercles. Exudation also occurs into the superficial spongy stratum of the true skin, causing thickening and an appearance of great coarseness; as well as into the neighboring connective tissue, producing œdema. About the same time, an excess of brown pigment is deposited in patches. Then the brawny-looking skin

slowly undergoes a gelatiniform degeneration; while as portions of this degenerated material get atrophied, so white spots and cicatrices are left, though there has been no wound or ulcer. The alæ of the nose, the integuments of the cheek, the tissues of the lips and ears, become swollen and bloated. There is a copious mucous discharge from the nostrils. The eyes present a livid watery appearance, the conjunctivæ being in parts congested; while the lids get tumid and flabby, little nodules are formed on them, and their edges are sometimes everted. The hairs of the head and face assume a yellowish-brown or reddish tinge at first, and subsequently become white: often they fall off in considerable quantity. The mucous lining of the nose, mouth, palate, glottis, and throat is all engorged and pulpy-looking, while here and there it is spotted with little tubercles which may ulcerate; so that there is an abundant secretion of viscid saliva or of muco-purulent matter, with hoarseness or loss of voice. The nails become discolored and squamous. Glandular tumors form; the inguinal glands swelling first and most extensively, and then those of the axilla. An unpleasant kind of greasy sweat often exudes from the surface of the whole body, but especially from the swollen hands and feet. The skin is not insensible to the touch: perhaps a sense of heat and itching is complained of. Muscular cramps are common. Until now the venereal passion may have been excessive. As the tuberculated masses increase in size and spread over the neck and chest, the trunk and extremities, so a lethargic condition of the mind and body gets developed. The general aspect is repulsive. Headaches are complained of; the extremities are contorted and swollen and useless; the testicles waste; and absorption takes place of the bones of the palate and of the nose, so that the latter organ becomes flattened. Complications now arise: there is frequently albuminuria, dysentery or chronic diarrhœa, or some bronchial or pulmonary mischief.

During the progress of the foregoing series of changes, complaint is often made of pain. This may at first be slight, so that it will possibly be looked upon as of a rheumatic or neuralgic character. But while the tuberculated masses have been forming in the skin, a congestion of the capillary vessels of the sheaths of the nerves has been taking place; producing an exudation of a viscid gelatinous material into the sheaths and connective tissue, and thus distending the nervous trunks to double their size. In this way we can account for the occurrence of hyperæsthesia followed by anæsthesia; the pressure of the congested skin and distended capillaries at first causing great pain, while the subsequently increased compression from exudation benumbs the sensibility. According to Mr. Erasmus Wilson the neurotic affection begins at the periphery, and proceeds towards the centre; the cutaneous nerves being first destroyed, then the nervous trunks that supply those nerves, and slowly and by degrees the nervous centres—the spinal cord and brain. At first and for years these morbid changes are attended with fugitive and shooting pains; but ultimately they terminate in perfect insensibility, so that the knife can be used without pain, or a taper may be held to the affected skin without being discovered by the patient.

The *non-tuberculated* form of leprosy commences by the formation of one or two circumscribed patches on the hands, or face, or feet. These patches are shining and wrinkled and rather paler than the surrounding skin; while they are so devoid of sensibility that the application of a hot iron is not felt. Frequently, large bullæ form on these patches. These bullæ break and leave ulcers, which usually scab and heal. Slowly, the affected parts spread; and as they do so certain constitutional symptoms arise. The pulse becomes infrequent, and slow or laboring; the mental faculties get

sluggish or benumbed; there is a sensation of coldness of the surface; there is constipation, though the appetite is voracious; and the ends of the fingers and toes seem glazed, as well as rather swollen and stiff. As months, or perhaps years pass on, the cuticle cracks in different places and desquamates; while frightful ulceration, unattended with any pain, occurs on portions of the extremities. The integuments about the small joints seem to slough off in large flakes; the interior of joint after joint gets exposed; and there is a constant sanious discharge from the numerous wounds. The bones of the toes or fingers get exposed, loosening as they do so; until after a time, one phalanx after another comes away, leaving behind granulating sores which ultimately heal. The hands and feet, thus deprived of portions of osseous support, get contorted into all kinds of shapes. Ultimately the limbs may become entirely useless, the patient being obliged to crawl about from one part of the room to another. The axillary and inguinal glands swell. The temperature of the body gets much reduced; the thermometer sometimes showing a diminution to the extent of 20° Fahr. There is ozæna, and the surface exhales a loathsome fetor. The sensibility of both mind and body gets greatly blunted; so that until the sufferer is relieved by death, there is a mere animal life, his loathsome state being usually more distressing to those who witness it than it is to himself.

Morbid Anatomy.—The reports of Drs. Danielssen and Boeck on the changes found after death in the leprous patients at the Bergen hospital are so important, that no apology is necessary for directing attention to the following summary of them. In the developed stage of the *tuberculated* variety, the corion or cutis vera of the affected parts is tumid and thickened; while on squeezing it between the fingers a viscid or gruelly fluid exudes. The subcutaneous connective tissue is infiltrated with a gelatinous or lardaceous effusion, firmly adherent to the corion. The subcutaneous veins and nerves are thickened and enlarged from the deposit of this effused matter on their outer surface. In the advanced stage, the nerves, especially when lying near to ulcerations, are much thickened and enlarged; in consequence of congestion and inflammation of their sheaths. The mucous lining of the nares and fauces and larynx is swollen; while it is occupied with tubercles, and often ulcerated. The opening of the larynx is frequently the seat of morbid deposit, so that the rima glottidis is sometimes nearly closed up. Tubercles are occasionally found on the mucous lining of the trachea and large bronchi. The cervical glands are occasionally much enlarged. The substance of the lungs is seldom altered; but the pleuræ are often much thickened from tuberculous deposits, as is the peritoneum. The mesenteric glands are very generally more or less enlarged. Isolated rounded ulcers are occasionally found on the inner surface of the intestines. The liver is now and then the seat of tubercles. The kidneys are almost always affected in the advanced stage of the disease; the morbid changes being usually those characteristic of albuminous nephritis. Within the cranial and vertebral cavities no distinct or uniform morbid changes have been detected, neither in the substance of the brain or spinal marrow, nor in their investing membrane.

When the *anæsthetic* form has been completely developed, and the paralysis of the muscles as well as of the skin has become decided, the skin is often found much attenuated, all the fatty matter has disappeared, and the substance of the muscles is atrophied. The connective tissue in the parts surrounding the seat of ulceration or necrosis is infiltrated with a serous or lardaceous deposit. The nerves which traverse this infiltrated tissue, as well as the deepseated ones, are excessively swollen; their sheaths being filled with a firm albuminous matter in which the ultimate nervous fila-

ments are imbedded. These alterations are considered to be the result of inflammation of the nerves, and are identical with those found in the tuberculated form of the disease. The axillary and inguinal glands are often much enlarged. The nervous centres are commonly the seat of notable alterations. Especially, there is congestion of the posterior or dorsal veins of the spinal marrow; effusion of an albuminous serum within the arachnoid membrane, and between it and the dura mater; adhesion of the arachnoid to the pia mater; and consolidation or hardening of the substance of the spinal cord at the parts affected, which most frequently happen to be the cervical and lumbar regions. Generally, the cord is also somewhat contracted in size; but sometimes it is so atrophied as not to be much larger than a quill. The cineritious substance is altered, having acquired a dirty yellow color so as nearly to resemble the medullary substance. The roots of the nerves within the vertebral canal are coated with albuminous exudation. Sometimes the axillary and ischiatic plexuses, and the principal nerves issuing from them, are visibly atrophied. The morbid appearances discovered within the cranial cavity appear to be similar to those which exist within the spinal cavity, though they are observed in a less decided or advanced degree. Whenever there had been well-marked anæsthesia of the face, the Casserian ganglion was always seen to be the seat of some change. There was usually a sero-albuminous effusion around it, many times so considerable that the distended dura mater bulged out at the part; while the nervous filaments of the ganglion seemed to be glued together by the exuded matter.

With respect to the condition of the blood in both the tuberculated and the anæsthetic forms of leprosy, the most marked change from the normal standard appears to consist in the excessive quantity it contains of albumen and fibrin. These, it will be remembered, are exactly the elements, more particularly the albumen, in the morbid effusion with which all the pathological alterations, characteristic of the disease, are connected.

Treatment.—Although cases of recovery are not unknown, yet as a rule this disease is incurable. The patient's hope of a cure may, however, be increased by removal from a malarious to a high and dry salubrious district; by allowing a nutritious, wholesome, palatable, and digestible diet; and by insisting upon strict attention to personal cleanliness. The use of baths is very advisable; but it is uncertain whether any special good can be derived from arsenical, sulphur, or iodine baths. I should certainly be inclined to give the arsenical baths a fair trial; administering them on alternate days with the wet-sheet packing (F. 136).

With regard to ordinary drugs those on which most reliance may be placed are cod-liver oil, quinine, and steel. The efficacy of arsenic and iodine must be allowed to be doubtful. A long-continued course of purgatives has sometimes appeared beneficial. In two instances of tuberculated leprosy which I saw at St. John's Hospital for Skin Diseases, and notes of which I am enabled to give here through the courtesy of Mr. J. L. Milton, more relief seemed to be derived from the use of aperients with nourishing food, than from various other plans of treatment.* In the selection of

* CASE I.—Thomas C., æt. 18, was admitted into St. John's Hospital, under the care of Mr. Milton, on April 16th, 1867, suffering under well-marked symptoms of leprosy. He is of Irish parentage, but was born in the Madras Presidency. When a lad he was sent over to Ireland to be educated. Four years after leaving India, in May, 1863, the disease first commenced as a pricking sensation in the extremity of the right little finger; this pricking being gradually followed by complete insensibility. During the next two years the anæsthesia steadily spread till, on the inside

perients it will be better to trust to the most simple. Few perhaps will answer better than the sulphate of soda; none can be worse than such as contain one or other of the different preparations of mercury. With regard to this metal its use may indeed be positively forbidden; since the uni-

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of the arm, it reached the armpit. In the winter of 1865 tubercles began to appear on the forehead and then under the eyes: the nose, chin, and cheeks were next invaded. Anæsthesia now attacked the left leg, all the lower part of which became insensible. Subsequent to this the right leg was affected in the same way. Bronzed spots, accompanied by tubercles, now made their appearance on different parts of both legs and thighs; while the left arm likewise became slightly affected.

At the time of his admission, the face was entirely covered with dirty reddish-brown tubercles which were of all sizes from that of a split pea to the bigness of half a small walnut. They were smooth and painless; on some few of them thin small scales were seen. There were several of these tubercles on the under part of the chin and on the sides of the neck, but none on the back of the latter. Nearly the whole of the right arm was covered with brown stains of every depth of hue; there were some on the left, but much fewer and smaller. These stains varied in size from that of a pea to that of a crown piece. In every part that showed a stain sensation was lost. He used when at school to amuse himself by cutting these places with a knife and never felt any pain from doing so, though they bled. The legs were even more extensively affected by spots and anæsthesia than the arms; the patches too extended over the thighs, whereas the upper arms were pretty free.

With one short interval the patient remained in St. John's Hospital up to the middle of June, 1868. During this period there was but very little change, and that little was always for the worse. Now and then the disease appeared to be stationary, but there has never been any lasting improvement. The hue of the skin has become darker, the tubercles have spread a little, a firm scale has formed over one elbow, while a large firm crust occasionally appears on the outer side of the left nostril; but with these exceptions the symptoms have not materially changed. He says he has always noticed that the complaint gains ground in winter, and is better or at least stationary during summer. Except occasional attacks of pain in the right arm and liver and diaphragm, at times very severe, he has not suffered much.

The medicines tried were iodide of potassium, strong decoction of sarsaparilla, the Zittman treatment, calomel and black draught, steel, nitric acid, and a preparation of quinine and carbolic acid. Of all these, the iodide and the purgatives were alone beneficial. The others were either useless or injurious; except the calomel and black draughts, which repeatedly checked the progress of the disease and relieved the pains. Had brisk purgatives been given persistently and from the first, it is thought that some benefit might have resulted; but as Mr. Milton had had no previous experience of their effects in this disease, he was afraid of the action of such powerful medicines on a weakened constitution.

The urine was several times analyzed and examined microscopically, but except very extraordinary variations in the amount of the nitrate of urea nothing unusual was seen: it contained no albumen and no blood. Mr. Milton could detect no change in the blood; and Mr. Robert Taylor, who examined a specimen, found it quite normal.

Case II.—George H., æt. 38, entered St. John's Hospital, under Mr. Milton's care, on May 17th, 1867. He was suffering under anæsthetic and tubercular leprosy in a very aggravated form. The disease began more than eight years previously, and according to his account followed a severe attack of ringworm, which almost entirely covered him with patches from an inch to a foot in diameter. Nearly a year after this his face became remarkably flushed and puffy. Finding that he got no better, he came home on leave and placed himself under the care of an eminent physician in Dublin. He recovered and went back to Trinidad, but the disease reappeared and gained ground rapidly. His case was treated in Trinidad with arsenic in large doses and purgatives; under which the improvement was so considerable that at one time he thought he was getting rapidly well. Unfortunately the treatment was neglected, and a relapse ensued. He came home again, but becoming worse and worse, quitted Ireland and entered St. John's Hospital.

At this time he was in a dreadful state. The tongue was tubercular and fissured, the voice thick and hoarse, the nose sunk in, the mucous membrane of the lips ulcerated away, the muscles of the arms and legs shrunk to the last degree, the hands incurved, and nearly all the skin stained with the characteristic hue of leprosy. The tips of the fingers were ulcerated; while the skin of the face was tuberculated and

versal experience shows that it acts most injuriously in whatever form it is tried.

Perhaps no article in the materia medica has been more freely employed in this disease than arsenic. The Hindu doctors have long used it very extensively. Mr. Palgrave tells us that the Arabs suffer much from leprosy, which sometimes assumes the blotchy form called "Baras," and sometimes the hideous "Djedām." Under this latter, "the joints first swell, then break out into sluggish yet corroding ulcers, and at last drop piecemeal, while frightful sores open in various parts of the body, especially about the back and loins, till death comes, though after too long delay. The 'Baras' also, though never fatal, may lead to superficial ulceration." The natives have hit on a vigorous "though too often an unsuccessful specific in the sulphate of arsenic, or yellow arsenic, for so they call it; and now and then they cure with it, occasionally killing by an overdose or smearage."* Even these "now and then" cures must, however, be looked upon with suspicion; for although a leper will possibly have recovered while taking arsenic, yet it requires a much larger amount of evidence than can be adduced to lead to the belief that there was any connection between the medicine and the cure.

Lastly, Dr. Danielssen and Boeck say they have found, in the anæsthetic form of the disease more especially, that the repeated application of cupping-glasses and moxas along the course of the spinal column has proved of marked advantage in relieving the lesions of innervation; whether these agents have been adopted during the stage of increased or of diminished sensibility.†

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dirt-colored, and there were large tenacious crusts upon it. He was put upon purgatives, and at first seemed to derive great benefit from them: in particular the ulceration of the lips entirely healed up. Here too Mr. Milton was afraid to continue the remedies; but when they were left off the symptoms relapsed, and when they were tried again the progress under them was slow. At length he grew dissatisfied; and was accordingly transferred, on January 22d, 1868 to the Middlesex Hospital, where he died quite suddenly on April 14th.

* Narrative of a Year's Journey through Central and Eastern Arabia (1862-63). Second Edition, vol. ii, p. 34. London, 1865.

† The foregoing remarks have necessarily been made as concise and practical as possible. But if it be desired to follow up the study of this disease at greater length, the reader will find much valuable matter in the following works: An essay by Mr. Robinson in the Medico-Chirurgical Transactions, vol. x, p. 27. London, 1819.—Antiquarian notices of Leprosy and Leper Hospitals in Scotland and England, by Professor Simpson, Edinburgh Medical and Surgical Journal, October, 1841, January and April, 1842. The number of this Journal for January, 1842, also contains a paper on tubercular elephantiasis by Dr. T. B. Peacock; while that for July, 1842, has one by Mr. J. Kinnis.—Traité de la Spedalskhed ou Elephantiasis des Grecs, par D. C. Danielssen et Wilhelm Boeck, Paris, 1848.—Cazenave's Manual of Diseases of the Skin, translated from the French by Dr. T. H. Burgess. Second Edition. p. 314. London, 1854.—Report on Leprosy by the Royal College of Physicians. Prepared for Her Majesty's Secretary of State for the Colonies. London, 1867.—On Diseases of the Skin, A System of Cutaneous Medicine, by Erasmus Wilson, F.R.S., &c. Sixth Edition, p. 587. London, 1867.—An account of two cases in the Guy's Hospital Reports. Third Series, vol. xiii, p. 189. London, 1868.—In the Bible, the chief description occurs in chapters 13 and 14 of Leviticus. But there are also notices of lepers and leprosy in several of the other books, especially in the fifth chapter of Numbers; in the second book of Kings, chapter 5; the second book of Chronicles, chapter 26; as well as frequently in the New Testament,—the gospels of St. Matthew, Mark, and Luke.

XVI. MELANOSIS.

Melanosis is a very rare disease; and consequently our knowledge concerning it is not very extensive. It is characterized by the deposition, in various tissues of the body, of a black or dark-brown substance; whence its name,—from μέλας = black νόσος = disease.

Melanotic formations may take place in various parts of the body, may present much variety of form, and may owe their production to different agents. They are divided by Dr. Carswell into two great groups:* (1.) True Melanosis, of which there is only one class. And (2.) Spurious Melanosis, of which there are three kinds—*a*, that arising from the introduction of carbonaceous matter; *b*, from the action of chemical agents on the blood; and *c*, from the stagnation of the blood.

1. **TRUE MELANOSIS.**—This disease has its seat most commonly in the connective and adipose tissues; but it is also found, though rarely, in the mucous and serous membranes, in tendons and cartilages, as well as in the osseous system—particularly the bones of the cranium, the ribs, and the sternum. The organs it most commonly affects are the liver, lungs, spleen, pancreas, lymphatic glands, brain, eye, kidneys, testes, uterus, ovaries, rectum, and mammæ. Moreover, melanotic matter has been detected in the blood—particularly in that taken from the minute veins of the liver. Andral states that he has met with it in the false membranes formed on serous surfaces. The black pigment-granules of melanotic matter may be infiltrated through a cancerous tumor (melanotic cancer), or through a benign growth. In short, melanotic disease has a great tendency to extend to different parts of the body through the lymphatic system.

Varieties.—Dr. Carswell describes four minor forms of true melanosis: (1.) The *punctiform*, in which the black coloring matter appears in minute points or dots, grouped together in a small space, or irregularly scattered over a large surface; this variety being more frequently seen in the liver than in any other organ. The gland looks as if it had been freely dusted with charcoal. (2.) *Tuberiform melanosis* (the most common and conspicuous of all the forms) may occur in the majority of the different organs, if not in all, as well as on serous surfaces, such as the pleura and peritoneum. The tumors vary in size from a pin's head to an orange; they are either single or aggregated together, in the latter case producing irregularly shaped masses of great bulk; they are seen inclosed in a membranous covering, or they will be non-encysted; and coexistent with them the punctiform variety is found in the liver, lungs, and kidneys. (3.) *Stratiform melanosis* occurs only on serous membranes. The black matter is frequently so small in quantity, that the tissue on which it is deposited may merely appear as if stained with it; or it will be more abundant, so as to give rise to a distinct layer, of the consistence of firm jelly. This form is much more frequently met with in the horse than in man. (4.) *Liquiform melanosis* is chiefly produced in natural or morbid cavities. Dr. Carswell says that he never saw it in man as a product of secretion; but that he has met with it in consequence of the destruction of melanotic tumors, and the effusion of their contents into serous cavities. The accidental cavities in which it has been found have been chiefly ovarian cysts.

It is probable that the melanotic matter is deposited in a fluid state, and

* Pathological Anatomy. Section on Melanoma. London, 1838.

that it acquires consistence by the absorption of its more liquid parts. It has never been found solid in serous cavities, where its diffusion is not impeded by unyielding tissues; but in the liver and lungs the tumors may have about the same consistence as a lymphatic gland. The black matter is almost tasteless and odorless, and chemical analysis shows that it is essentially composed of the constituent elements of the blood. According to M. Foy, it is the coloring matter of the blood highly carbonized.

Symptoms.—In subcutaneous melanosis, the peculiar appearance of the tumors or nodules removes all difficulty as to diagnosis. But the symptoms accompanying melanotic deposits in internal organs are rarely well marked; so that their presence is often only ascertained after death. Dr. Copland states,* that as far as the symptoms have been recorded, and as far as he could observe them in a single case, melanosis is characterized by a gradual sinking of the vital energies, a cachectic habit of body, and a dusky ash-colored countenance. There is also a marked change in the nutritive functions; this deterioration slowly giving rise to emaciation, dropsy, weakness of the pulse, and night-sweats towards the termination of the disease. Occasionally, when the lungs have been affected, there has been a blackened mucous expectoration.†

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* A Dictionary of Practical Medicine, vol. ii, p. 830. London, 1858.

† A very interesting example of extensive subcutaneous melanosis was under the care of Sir William Lawrence, at St. Bartholomew's Hospital, a few years back. From the account which has been published (Medical Times and Gazette, p. 225, February 27th, 1864), and from a letter with which Mr. Eccles has favored me, I am enabled to give the following particulars of the patient's history: J. F., aged thirty-three, was in an emaciated low condition, when admitted on January 28th, 1864. He had been a railway porter for eleven years, was married, and the father of two healthy children, and his parents were living. Eighteen months previously he first noticed a lump in each groin the size of a hazel-nut. Six months subsequently another growth, resembling a wart, appeared just below the umbilicus, which increased rapidly in size, was removed by ligature, and left only a black mark. Until two months ago he was strong and well, no fresh nodules having appeared; but at this time, the hundreds which were found scattered all over him at the date of his entrance into hospital, made their appearance, and his health gradually deteriorated. When admitted, the original lumps in the groin were about the size of small eggs; being hard, nodular, very movable, and apparently consisting of enlarged glands. Scattered over the trunk and the lower and left upper extremities, were innumerable nodules which varied from the size of a millet-seed to that of a full-sized pea, and seemed to be situated in the subcutaneous tissue. They were thickest over the abdomen and back; but, in the thighs, laid chiefly in the course of the vein. Similar nodules were felt in the situation of the lymphatic glands in the neck. He complained of some pain in the right lumbar region, but otherwise did not suffer much, save from a continued sensation of sinking. No blood was detected in the urine, although he said that of late he had passed blood in his water. There was no evidence of the disease being of a cancerous nature. A microscopic examination of the melanotic matter showed only the small pigment granules and the larger pigment-cells. On February 9th, the day after death through exhaustion, Mr. Eccles made an examination of the body. On reflecting the abdominal integument, the nodules were proved to be, with few exceptions, entirely subcutaneous. They were easily separable from their connections, were of the consistence of soft putty, and were quite black. One rib, just at its junction with the costal cartilage, was infiltrated, and the bone softened, so as to be easily cut through with a scalpel. Somewhat larger nodules were scattered over the interior of the thorax, beneath the pleura: and a like condition existed in the pericardium, the cavity of which was filled with a dark serous fluid. Similar deposits were found beneath the visceral layer of the pleura, especially between the lobes, and some of smaller size in the substance of the lower lobes of each lung. The bronchial glands were apparently wholly infiltrated. The heart was studded on its exterior with numerous nodules (very like ordinary dry black currants), which here and there seemed to involve the muscular tissue of the heart. Similar deposits were situated beneath the endocardium, but the valves were unaffected. The liver was only

Pathology.—It is still a matter of uncertainty whether true melanosis is ɔt simply medullary cancer modified by the formation of black pigment . its elemental structures. Mr. Paget (writing prior to seeing Sir W. awrence's patient) says: "On this long-disputed point there can, I think, ɜ no reasonable doubt. I have referred to a case of melanotic epithelial ıncer; but, with this exception, I have not seen or read of any example f melanosis or melanotic tumor in the human subject which might not be ɜgarded as a medullary cancer with black pigment. In the horse and dog, believe, black tumors occur which have no cancerous character; but none uch are recorded in human pathology."* On the other hand, Dr. Walshe ıntertains a directly opposite opinion, and for the following reasons: "1. That the melanic pigment should in itself constitute cancer is an absurdity: it never even forms a stroma, as the cells continue permanently free. 2. The stroma of many melanic tumors is perfectly distinct in its physical, chemical, and microscopical characters from all cancerous stromata. 3. Many melanic tumors do not contain cancerous juice. 4. The microscopical characters of the pigment-cells and granules are the same in all kinds of growth in which they occur. 5. Melanic tumors, when no ordinary cancerous elements exist in them, cause no local or general symptoms except those dependent on the size and seat of the growth. 6. When melanic tumors produce the local or general symptoms of cancer, they are found either to be composed of encephaloid or scirrhus, wholly or in part impregnated with black pigment. 7. Neither the local nor general symptoms produced by carcinoma are modified in cases in which melanic matter is found to pervade it. 8. The circumstance that melanosis is rarely solitary, is strongly insisted upon by Cruveilhier, as a ground for ranking it with cancer. But tubercle multiplies similarly, yet assuredly tubercle is not cancer."† Unfortunately, I can myself say but little upon this matter; though it seems to me, from a careful study of those recorded cases which are scattered through our literature, that there is great reason to doubt whether melanosis is so closely allied to cancer as many pathologists assert. It is not a very uncommon disease in horses, especially in those of a gray color; and it is said that in these animals life is scarcely shortened by its presence, though it exhibits the same tendency as in man to multiply itself in different parts of the system.

Melanosis is most often met with in the middle-aged, or even in those advanced in life. Mr. Wardrop, however, has seen it in a little girl only two years old, in whom "the humors of the eye were converted into a black gelatinous substance." Where the disease attacks the skin, it will often be found to have commenced in or near a congenital mole or a wart.

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slightly affected, the disease seemingly extending from the surface into the substance of the viscus. The fibrous capsules of the kidneys were greatly affected, especially the right, only a very little of the structure of these organs being apparently implicated. The suprarenal capsules were not examined. The spleen was very firm and small; but no deposit could be detected. Attached to the omentum were several masses of disease, of which the largest were two lying in the cavity of the pelvis, each somewhat larger than a man's fist. On cutting through these, they were apparently uniform in structure throughout. The intestines were seemingly natural, save that the rectum contained some pinkish-colored fæces. The brain, orbits, &c., could not be examined; an unfortunate circumstance, as the man had gradually become blind a few days before his death. The mesenteric glands were affected in the same way as the bronchial; and there were numerous nodules beneath the peritoneum in the subperitoneal tissue.

* Lectures on Surgical Pathology. Edited by William Turner, M.D. Second Edition, p. 731. London, 1863.

† The Nature and Treatment of Cancer, p. 184. London, 1846.

Treatment.—On this head there is little to be said that is satisfactory. Indeed, all that can be done is to attempt to relieve and combat the distressing symptoms as they present themselves. The two classes of medicines which will be found most useful are tonics (especially the mineral acids with bark), and cholagogue purgatives. The necessity for good diet, sea air, and a moderate amount of exercise, should also be borne in mind.

2. SPURIOUS MELANOSIS.—There are three kinds of this counterfeit disease. They arise thus:

a. From the Introduction of Carbonaceous Matter.—This variety of false melanosis—sometimes spoken of as black phthisis—occurs only in the lungs. These organs present a black carbonaceous color; the bronchial glands are also blackened; while the pulmonary tissue is indurated and friable, infiltrated with black serum, and often broken down into irregular cavities. The discoloration has its origin in the inhalation of the carbonaceous product of ordinary combustion; as well as in the inspiration of air loaded with minute particles of coal. Hence, it is chiefly found in the lungs of those who have worked in coal mines.

b. From the Action of Chemical Agents on the Blood.—In digestion of the coats of the stomach by the gastric juice after death, and in poisoning by acids, the blood contained in the gastric capillaries, as well as that which is extravasated, will generally present a blackish tint. Sometimes the blood is almost as black and thick as tar; while it adheres to the fingers on being handled, and imparts a peculiar impression something like that produced by glycerin. The inhalation of sulphuretted hydrogen gas will also darken the blood in the intestinal capillaries.

c. From the Stagnation of Blood.—Retarded or impeded circulation may produce black discoloration of the blood. When this fluid ceases to circulate in the capillaries of an organ, it coagulates, the serum and salts become absorbed, and a black substance remains. The latter probably consists of fibrin and hæmatin. The organs in which the foregoing changes occur are the digestive and the respiratory.

XVII. FATTY DEGENERATION.

The designation of *fatty degeneration or fatty metamorphosis,* is given to a certain class of cases which during life are marked by the occurrence of progressive anæmia with great prostration, and which, after death, are found to be distinguished by the more or less perfect transformation into fat of various important textures, but especially of the muscular fibres of the heart.

Fat is an important element of the human body. There is the adipose tissue, in the cells of which oily materials are naturally stored up for the welfare of the individual. And there are other textures—as the villi of the mucous coat of the duodenum and jejunum, where this element transitorily abounds after the digestion of particular kinds of food. But in the cases about to be treated of, fatty matter is present in abnormal situations; the tissues being more or less converted into this substance. As a consequence of this deterioration there may result the most diastrous lesions. There is, therefore, no connection between the tendency to form fat around organs, or to the production of obesity, and the change of textures into fat. In the

former case we have a condition which may prove preservative, if confined within due limits. In the latter, we recognize only a process of decay and death; the result of some defect in the nutritive functions. A tissue once completely converted into fat (and there is no tissue in the body which may not undergo such conversion) cannot be reconstructed by human aid. The extension of this degeneration, however, can now and then be hindered; while the work of the affected organ may be lightened by well-timed assistance.

A fatty degeneration of one or more of the viscera (most frequently perhaps of portions of the muscular fibres of the *heart*) is very commonly found after death from chronic disease, or even from old age. Inactivity, impaired nervous power, the persistent yielding to some master-passion, overstudy, and cessation of function, lead to this change; as does phthisis, excessive or small continuous losses of blood, continued fever, and indeed all wasting diseases. Intemperance is a fruitful source of it; so is long-continued privation of good food and pure air; and so also appears to be a residence in tropical climates.

The fact that the tissues of even more than one organ are in a state of degeneration, must simply be taken as an indication that life is somewhat in peril. Not that death is necessarily imminent; but that the individual, if he would live, will be obliged to exercise great and constant caution. The bloodvessels of the brain may long have their coats affected, and yet offer no impediment to the flow of blood or to cerebral nutrition; but let any sudden strain be put upon them, and sanguineous apoplexy at once results from their rupture.

All varieties of cell-formation may undergo fatty degeneration; the process commencing at first with the production of a few fatty molecules, and continuing until the amount is so great that the cell-wall gives way. The *liver* is particularly liable to be thus affected, the hepatic cells becoming enlarged and loaded with oil-granules. There are certain forms of *Bright's disease* in which the epithelium of the convoluted uriniferous tubules is found in a state of fatty degeneration; the degenerated epithelium so filling the tubules that they present a yellowish-opaque appearance. In fatty degeneration of the *muscular fibres of the heart*, the metamorphosis may go on until all normal structure has disappeared in the portions affected. The same not unfrequently occurs in the internal coat of the walls of *arteries*, the change being often visible to the naked eye in the shape of round or angular white spots; such parts, on being minutely examined, presenting the usual characteristic appearances. The atheromatous change which happens in the arterial walls of old people—particularly in the aorta, is a form of fatty degeneration; beginning with a low kind of inflammation of the arterial coat, and often ending in softening and ulceration. If an atheromatous patch be submitted to microscopic examination, it will be seen to consist of fat-globules, plates of cholesterin, granule-cells, and amorphous fragments of tissue. Again, in certain diseases like paralysis, deformities of the limbs, spinal curvature, &c., the *muscular structures of the affected part* may undergo transformation into fat; so that they are observed on dissection to be pale and thin and yellowish, or marked longitudinally with alternate red and yellow streaks. This latter appearance is due to the deposit of fat between the primitive muscular fasciculi, combined with real fatty degeneration. It is a condition which can be well examined in any of the voluntary muscles of overfed prize cattle. And lastly, about the age of fifty, when old age begins to steal on by slow degrees, the corneæ may be the first to tell the unwelcome truth. The *arcus senilis*, commencing at the upper and outer margin of the clear cornea, and occurring symmetrically in both

eyes, is the result of the retrograde metamorphosis under consideration. And this change is of special importance, inasmuch as it is sometimes indicative of a like alteration going on in organs beyond our ken. I say "sometimes," because it is certain that it may exist alone, the tissues of the heart or liver or kidneys being healthy; or the latter may be undergoing fatty degeneration without the arcus being present.*

The designation of *idiopathic fatty degeneration* has been given by Dr. Wilks to a class of cases in which excessive anæmia and debility are the peculiar phenomena during life; and a fatty degeneration of many parts of the body, but more especially of the heart, the characteristic changes detected after death. The term idiopathic is used to disconnect these cases from those instances of fatty change of organs which are found as accompaniments of other diseases.

Perhaps the symptoms and progress of a case of idiopathic fatty degeneration may be made more clear by the sketch of a typical example: A woman, thirty-five years of age, married but never pregnant, complains of great and increasing debility. For the last eighteen months she has had much mental anxiety; but her diet has been good, her home healthy, and she has not suffered from any exhausting disease, such as hemorrhage, diarrhœa, &c. As far as is known she has never had ague, nor lived in a malarious district. She has taken drugs of various kinds without any benefit for almost a year: to her surprise, the favorite antibilious pills have disagreed unmistakably. The catamenia are regular though scanty, and there is no leucorrhœa; she is thin but not wasted, is weak, and presents a marked pallid aspect; there is no arcus senilis; the pulse-beats are only forty, and there is an anæmic cardiac murmur; while the lungs, lymphatic glands, liver, spleen, &c., appear not to be diseased. Moreover, the urine contains neither albumen nor sugar; and on examining the blood microscopically no excess of white corpuscles can be detected. We hope that by the careful administration of a nourishing diet, together with bark or quinine and iron, the symptoms may become ameliorated. But this expectation does not get realized. The strength rapidly gives way; there is neither pain nor anxiety. In a short time, perhaps at the end of a month or two, we find that there have been frequent attacks of sickness and purging; the legs have become slightly œdematous; while she is reduced to such a condition of weakness that she can scarcely raise herself in bed. A few days later she is found in a half-conscious state; and then at the end of some hours death happens. At the autopsy it is noticed that the body is spare, but not wasted as in phthisis: all the tissues are very pale, and the viscera appear bloodless. The brain, lungs, intestines, spleen, and suprarenal capsules, are healthy; as are also the generative organs. The liver, however, is pale and fatty; while the muscular tissue of the heart has undergone an extreme degree of fatty degeneration, presenting a pale mottled appearance to the naked eye. This change is chiefly seen in the left ventricle, which exhibits the appearance of white striæ of fat, every part being occupied by this fatty change: the right ventricle is less affected, and the auricles look healthy. On examining with a quarter-inch object-glass some of the fibres from the left ventricle no traces of transverse striæ can be seen, but only a large number of small oil-globules, with free fat-globules which have escaped from the ruptured fibres. The kidneys are pale, and healthy to the naked eye; but on a microscopic examination the tubules and secreting cells are found to contain a considerable amount of fatty molecules.

* The reader who wishes to study this part of the subject more closely should refer to Mr. Edwin Canton's excellent treatise On the Arcus Senilis, or Fatty Degeneration of the Cornea. London, 1863.

Sufficient has now been said to show the importance of a careful examination of this subject, which will be again referred to in treating of the diseases of various organs. Its extensive bearing on the practice of medicine cannot be better summed up than by quoting the words of the late Mr. Barlow, of the Westminster Hospital: "Who, a short time ago," says this gentleman, "would have dared to assert, unless from some morbid desire to be ridiculed, hemorrhage of the brain, the heart, the lung, and the placenta was often the result of fatty degeneration similarly affecting these parts and leading to their rupture? Who could have asserted that 'mollities ossium,' atheroma of arteries, and the arcus senilis, heretofore grand and unmeaning appellations, were only specimens of the same devastation? Who have affirmed that ramollissement of the brain and softening of the heart were (I say not, invariably) examples of it too? Who could have spoken of degeneration of the liver and kidneys as conditions associated with, and dependent on general atrophy? Who could have traced gradual to the same cause as sudden death, as now we can? Surely, there has been, to speak most modestly, a great and evident advancement in pathology."* These remarks need no confirmation at the present time, for universal observation has proved their truth. The entire subject of the various forms of degeneration of tissue, can hardly have too much attention paid to it. When a man is attacked with acute disease—with pneumonia, pericarditis, rheumatic fever, &c., the practitioner naturally thinks of the special treatment which these disorders require. But a more important matter still is to consider seriously the state of the patient's blood and tissues—of what is commonly called his constitution. Thus it is obvious, that the widest possible distinction must be drawn between the management of acute bronchitis, occurring in a previously healthy subject, and the same disease affecting an individual with granular kidney or with fatty degeneration of the muscular fibres of the heart. So, also, the ophthalmic surgeon, consulted as to the cure of a case of cataract, could, I imagine, scarcely advise an operation where the opacity of the lens appeared to be connected with diabetes; though under many other circumstances extraction would be the means of restoring sight. It is upon the recognition of these and similar points that the future prospects of the art of healing look so promising. Even as it is, much has been accomplished in this direction. We are able to see more certainly than our forefathers could what medical treatment will accomplish, and what it will not. And it seems to me that it is owing to this enlightenment—forasmuch as we know that degenerated tissue cannot be repaired by bleeding, or mercury or antimony, that recourse is had much less frequently to such active remedies than formerly; and not because there has been any change in the type of organic disease.

XVIII. AMYLOID DEGENERATION.

The discovery in the animal kingdom of starch, or, at least, of a substance which possesses properties allied to those of the amylaceous group in the vegetable world, is full of interest to the pathologist and physician. For some few years it has been known that the liver, spleen, and kidneys occasionally undergo a peculiar degeneration, which has been

* On Fatty Degeneration, p. 90. London, 1853.

described under the names of the *Lardaceous, Waxy, Cholesterin,* or *Albuminous Infiltration;* though until the publication of the researches of Virchow (1854–1859), we were not only ignorant of the nature of this substance, but of its exact seat. Even now our knowledge of this morbid process is very imperfect.

What we do know of the matter, as far as I can gather from a careful study of the writings of Virchow, Wilks, Francis, Harris, Gairdner, and the author of a very excellent article in the *British and Foreign Medico-Chirurgical Review* for October, 1860, together with the observation of the few cases which have been under my charge, seems to be as follows: In the human body there are to be found, according to Virchow, two allied, but not identical, substances. In the first place we find bodies which, in their chemical properties, are analogous to real vegetable starch, and in their form bear an extraordinary resemblance to vegetable starch-granules, inasmuch as they constitute more or less round or oval structures formed by a succession of concentric layers. They are in fact *starch-corpuscles* or *amylaceous concretions.* To this class belong the little corpora amylacea of the nervous system; the laminated bodies that are discovered in the prostate of every adult man, and which, under certain circumstances, accumulate in large quantities, so as to form the so-called prostatic concretions; and rare substances of a similar kind which occur in certain conditions of the lungs. These formations assume a blue color by the action of iodine, as vegetable starch does; the blue becoming green if they are mixed up with much albuminous matter, for inasmuch as the nitrogenous material is rendered yellow by iodine, while the amyloid becomes blue, the result must be green. The greater the quantity of nitrogenous matter the browner does the color become.

In the foregoing instances the starch-like matter lies *between* the elements of the tissues. Very different are the cases of disease, where there is a degeneration of the tissues themselves, in which all their component parts become filled with a *starch-like* or *lardaceous substance* and get gradually infiltrated with it, just as lime is diffused through the tissues in calcification. The change commences in the muscular fibre-cells of the middle coat of the small arteries; the walls of which vessels gradually get thickened, while their calibre becomes diminished. Then the morbid process involves the surrounding anæmic parenchyma; extending until the whole tissue in the neighborhood of the arteries is altered. This amyloid substance, thus infiltrated, has the peculiarity of not becoming blue under the influence of iodine alone, but of assuming a peculiar yellowish-red color; though it takes on either a blue or a violet tinge, if the application of iodine be followed by the very cautious addition of sulphuric acid. Hence this material seems less allied to starch properly so called, than to that substance which forms the external membrane of vegetable cells—cellulose; though it differs from this in becoming colored upon the application of a pure solution of iodine, whilst real cellulose is not at all colored by iodine alone. Owing to this multiplicity of reactions, it is difficult to say to what class the material really belongs; though it has been somewhat generally assumed, from its reaction with iodine and sulphuric acid, that it is analogous to the substances of the amylaceous group. Meckel, in an essay on *Lardaceous Disease,* cites the chemico-physical appearances as favoring the presumption that the material is cholesterin, or some closely allied fat. Virchow and others show, on the other hand, that the substance does not, in any way, behave like a fatty matter; while the reactions of cholesterin and the apparent amylaceous compound are so different that the two cannot be confounded. Finally, some careful analyses by Kekulé and others have tended to show

that there is a very close chemical identity between this morbid material and albumen; and hence it has been urged, that instead of our having to deal with amyloid degeneration of tissue, the substance is almost proved to be *albuminoid* in its nature.

Whatever the particular substance may be, however, the important fact remains, that in the so-called *amyloid*, or *albuminoid*, or *cellulose degeneration*, we have a remarkable constitutional disease, which generally invades several organs at the same time, and renders them incapable of performing their functions. The patients gradually assume a cachectic, broken-down appearance; they lose flesh and strength; dropsy often supervenes; the urine gets albuminous if the kidneys become affected; diarrhœa sets in when the digestive tract is involved; and in spite of remedies death soon takes place.

Where the liver, spleen, or kidneys have been the organs affected, an unpracticed eye might fail to detect the alteration in structure, unless there is an extreme amount of disease. But when, for example, we incise a liver where the process of amyloid degeneration is far advanced, a feeling is communicated like that experienced on passing the knife through a piece of wax, while the cut surface presents a semi-transparent appearance. The gland is also found increased in size; it has some resemblance to a fatty liver, though its increased weight distinguishes it; a sense on handling is given like that received from a lump of wax; and if the disease be very extensive, no trace of normal structure can be distinguished, though in an earlier stage the lobules are seen distinctly mapped out, owing to the matter being deposited within the lobule and in and among the secreting cells. Dr. Harris first employed chemical reagents to detect the presence of amyloid in the walls of the intestines; and he noticed that on brushing a solution of iodine over the mucous membrane of the affected portions, innumerable dark-red points corresponding with the villi appeared, which points became changed to a bluish steel-color on the superaddition of a drop of dilute sulphuric acid.

Virchow speaks of the occurrence of amyloid degeneration of the lymphatic glands as an undoubted fact; and in all probability he is correct. Dr. Wilks, however, with more caution, says, that the change in these organs is not strictly lardaceous, but is either a variety of it, or has a close relationship with it. It produces a lingering form of fatal cachexia. "The enlargement of the glands is in most cases gradual, extending sometimes over a period of two, three, or more years, and often from commencing in the neck in weakly children, is called scrofulous. When the mischief is thus gradual in its commencement, and affecting only part of the glandular system, no marked symptoms ensue, but as time tends to its development in the thoracic and abdominal glands, a slow prostration ensues, terminating in death."* The glands often get an enormous size; they have a peculiar elastic feel; they will form large tumors in the neck and groin; while the posterior mediastinal and lumbar glands may all be affected, or only these latter glands along the course of the aorta may be involved without any affection of the external glands. When these diseased bodies are removed, they are found as distinct tumors, very tough and solid. On making a section of one of them, the cut surface looks to the naked eye as if dotted over with points of wax; and though Dr. Wilks says no effect is produced by the application of iodine, yet Virchow maintains that this agent colors the diseased parts of the gland red, whilst the normal portions are rendered yellow. If when the iodine-red

* Guy's Hospital Reports. Third Series, vol. ii, p. 103. London, 1856.

hue is obtained we use sulphuric acid, a blue color may be procured if the exact proportion of acid necessary to effect this change be hit upon.

Sometimes the disease in the glands is associated with the presence of the peculiar wax-like substance in the spleen, or with lardaceous liver, and with tuberculosis. The symptoms in any case are those of anæmia, prostration, and final exhaustion. The lymphatic glands and spleen being connected with the blood-making process, the most injurious results must ensue if a gradual destruction of their texture goes on.

There is only one more important point to be briefly noticed—viz., that amyloid degeneration may either exist alone, or it will be present in connection with tuberculosis, suppuration, diseases of the bones, or syphilis. Thus, in phthisis, this form of hepatic disease is said to be much more common than fatty liver; while sometimes the amyloid and the fatty degeneration occur together. So frequently has amyloid degeneration been found connected with caries or necrosis, that at one time it was thought the osseous disease exercised some determining influence on the production of the amyloid material. Multiplied researches have proved, however, that amyloid degeneration is as frequently associated with phthisis and syphilis, as with bone disease. So, also, it was considered that Bright's disease often became associated with amyloid degeneration, until it was found that the former was sometimes merely a symptom of the latter affecting the kidneys. While lastly, evidence is accumulating rather rapidly which serves to show that there is some important link between lardaceous disease and long-continued suppuration. The two conditions have now been found connected together too often for such an alliance to be simply accidental.

XIX. MINERAL DEGENERATION.

The process by which mineral matter is infiltrated or deposited in a tissue must be briefly noticed. Every texture in the body is probably liable to mineral degeneration; but it is most frequently observed in the coats of arteries, and in the cartilages. Tubercular and cancerous growths may also undergo this change, while it not uncommonly occurs in fibroid tumors of the uterus.

The importance of discriminating between *calcification* and *ossification* has been well pointed out by Virchow. Formerly both these conditions were spoken of as "ossification." But a structure does not become true bone because it takes up lime into its intercellular substance, and has stellate cells present in it. On the contrary, it is merely "calcified" or "petrified." At the same time it is not to be forgotten that "ossification" does sometimes take place, with the formation of dense or compact and spongy or cancellated tissue, and occasionally even of periosteum.

The coats of large arteries are often found brittle from petrifaction. And this earthy degeneration may not only occur alone, but in combination with fatty degeneration or atheroma. Sometimes plates of mineral matter are discovered imbedded in the middle coat of the vessels, rendering them hard and rigid tubes.

All varieties of exudation have a liability to undergo the calcareous transformation; the animal matter becoming absorbed, while the mineral constituents get aggregated and so form laminæ. In this way Dr. Hughes Bennett states that he has seen the gall-bladder converted into a calcareous

shell, and the pericardium into an unyielding mineral box inclosing the heart. The cardiac valves have thus likewise become petrified.

With regard to fibro-calcareous tumors, Mr. Paget describes two methods by which calcification may advance,—a peripheral and an interstitial. In the former, the most rare, a common fibrous tumor becomes coated with a thin and rough and nodulated layer of chalky or bone-like substance. By the latter method a similar substance is more abundantly deposited throughout the growth; being often so arranged, that by maceration a heavy and hard mass can be obtained, knotted and branched like a lump of coral. With both forms the change is an earthy degeneration, consisting of a deposit of the salts of lime and other bases, in combination with, or in place of, the fibrous tissue. True bone is not formed in uterine fibroids.

XX. GOITRE AND CRETINISM.

The arrangement of goitre and cretinism in one section is not to be justified simply on the score of expedience. It is almost impossible to doubt the existence of some relation between these two diseases, although what the connecting bond may be, is as yet a matter of conjecture. But that they are often combined together in the same individual, is, of course, indisputable.

1. **GOITRE AND EXOPHTHALMIC BRONCHOCELE.**—The disease called *Goitre* [perhaps from *Guttur* = the throat] by the Swiss, popularly, in this country, *Derbyshire Neck*, from its prevalence in some parts of Derbyshire, and technically *bronchocele* [from *βρόγχος* = the windpipe + *κήλη* = a swelling], consists of a morbid enlargement of the thyroid gland. This produces an unsightly disease, which, though usually painless, is much dreaded by the inhabitants of those districts where it is prevalent.

The characters presented by the swelling vary according to its duration. It will either be soft, or firm, or very hard. The whole gland may be swollen, or the centre only, or either side. According to Alibert, the right lobe is more frequently affected than the left. The largest goitre that I have measured caused the neck to have a circumference of two feet. The swelling is unaccompanied by pain, and usually gives rise to little inconvenience beyond the deformity which it produces. Sometimes, however, throbbing of the vessels, inordinate pulsation of the heart, great depression of spirits, dyspepsia, and sickness are complained of; together with other symptoms indicative of an attenuated state of the blood. Dental caries and deafness are not uncommon. Moreover, distressing sensations may be induced by the pressure of the enlarged gland on the surrounding parts, while respiration and deglutition are rendered painful and difficult by the compression of the trachea and œsophagus. Goitre is much more common in women than in men, almost in the proportion indeed of twelve to one. Sometimes there appears to be a connection between bronchocele and irregularity of the uterine functions. Thus I have remarked in many cases that the enlargement of the gland is greatest at the catamenial periods, and especially when the flow is scanty. Other authors have also noticed that the disease makes the most progress during the puerperal state, and a few remarkable cases confirmatory of this opinion have fallen under my own observation. Profuse leucorrhœa is a frequent accompaniment of the

throat-swelling, whether pregnancy exist or not. The palpable swelling of the thyroid which is sometimes met with in hysteria led Dr. Graves to suggest that the globus hystericus, or sensation as of a ball rising in the throat, is due to a sudden congestion of this gland. It may be doubted, however, whether this peculiar sense of choking is not more plausibly explained on the supposition of an irregular action of the constrictor muscles of the pharynx, one of the many consequences of deranged innervation.

Wherever goitre prevails, popular opinion regards the water used for drinking as its cause. Dr. Edmund A. Parkes thinks it is certain that the water of goitrous districts contains large quantities of lime and magnesia; being derived from limestone and dolomitic regions, or from serpentine in the granitic and metamorphic districts. During the ten years, 1843–53, the water used in the food and drink of the prisoners at the Durham County Jail contained large quantities of sulphate of lime, carbonate of lime, and chloride of magnesium. The men in all classes, whether on low diet or otherwise, suffered extensively from goitre. The pumping machinery of the well then got out of order, and the water (filtered) of the river Wear was temporarily introduced for the use of the jail. The effect soon became apparent on the health of the prisoners, and the affections in the neck immediately subsided. So marked was this result, that the water of the well was analyzed by Professor Johnston, who condemned it as unwholesome and unfit for use.* Still more conclusive evidence has been brought forward by Mr. McClelland, who affirms, as the result of his personal inquiries, that goitre never prevails to any extent except in villages situated upon, or close to, limestone rocks.† The facts adduced by this gentleman in confirmation of his opinion are deserving of attention. At the mountain province of Kemaon, in Bengal, the inhabitants all belong to the same tribes of Hindoos, and are subject to fewer irregularities in their mode of life than any other people in the world. Yet, while the residents of some of the districts are almost free from goitre, those of other villages suffer extensively. The tract in which the disease most prevails is the richest and most fertile portion of the province. The natives themselves ascribe the prevalence of goitre to the quality of the waters. The following abstract of the proportion of inhabitants of each rock affected with goitre and cretinism, compared with the healthy, proves the probable correctness of this view:

Granite and gneiss rocks, ...	*Goitre*, $\frac{1}{500}$; *cretins*, none.
Mica slate and hornblende slate rocks, . .	*Goitre*, none; *cretins*, none.
Clay slate rock, ...	*Goitre*, $\frac{3}{33}$; *cretins*, none.
Green sandstone rock, ...	*Goitre*, none; *cretins*, none.
Calcareous rocks (chiefly Alpine limestone), .	*Goitre*, $\frac{1}{3}$; *cretins*, $\frac{1}{33}$.

When it is remembered that a district of more than a thousand square miles has been made the subject of the foregoing inquiry, that in every portion of this space the same circumstances attended the presence or absence of the disease, surely there must be something more than an accidental coincidence. And yet the inferences drawn by Mr. McClelland have not been allowed to pass unchallenged. They have been particularly objected to by M. Chatin, who mentions that in Savoy there are two villages divided from each other by only a narrow ravine. Both villages

* The Monthly Journal of Medicine, vol. xx, p. 377. Edinburgh, 1855.

† Sketch of the Medical Topography, or Climate and Soils, of Bengal and the N. W. Provinces. By John McClelland, Surgeon, &c., p. 83. London, 1859.

stand on rock and soil of the same nature, their elevation is the same, and they seem subjected to the same influences. But in one goitre prevails, while in the other it is unknown: in the first, the water supplying it contains a trace of iodine; in the second, there is no iodine in the water. In consequence of such contradictions as these, there has been a growing conviction in the professional mind that this disease is due to a combination of circumstances, rather than to a single cause, and it has been said to be probable that neither a marshy soil, nor the absence of the sun's rays, nor the configuration of the locality, nor the habits of the people, nor any peculiarity of the waters, will separately induce goitre. But in thus attempting to multiply the causes of this disease we are departing from that sterling canon of criticism—that the simplest explanation is always the best. In the present instance, moreover, there is less room for doubt than happens to be the case with many medical questions; and hence there is the less excuse for resorting to conjecture.

There is a *cystic variety of bronchocele*, in which cysts are developed in the thyroid body, instead of this gland becoming uniformly enlarged with solid matter. The lining membrane of these cavities is very vascular; so that if they be opened, and their brown-colored serous contents evacuated, they require to be well stuffed with lint to prevent hemorrhage. As granulations are thrown out from the walls, the cyst contracts; while ultimately it entirely closes. Iodine injections, in such cases, are not simply insufficient, but they may prove dangerous.

The first point in the *treatment* of goitre is, if possible, the removal of the patient from the affected locality. Then, in women, care is to be taken that the menstrual functions are regularly established. As regards therapeutic agents, the introduction of iodine, by Dr. Coindet, of Geneva, has in a great measure superseded all other remedies. The iodide of ammonium (F. 38) is often very beneficial; especially if its internal administration be accompanied by its employment locally. Bromide of potassium, in thirty-grain doses, has been recommended. Iodide of potassium is also useful (F. 31); and sometimes cod-liver oil, given with it, aids recovery. At the same time the tumor should be rubbed every night with the officinal iodine ointment, or painted with iodine liniment, diluted with an equal quantity of spirit or glycerin. The iodide of iron (F. 32), quinine and iron (F. 380), steel and aloes (F. 404), are all valuable medicines. A nourishing diet must be allowed, and the hygienic surroundings of the patient attended to.

A plan of treatment adopted in India by the late Major Holmes seems to have had great success.* This gentleman (who was barbarously murdered during the Indian mutiny) is said to have treated a large number of sufferers. The method, as practiced at Fyzabad, Oudh, is as follows: Three drachms of the red iodide of mercury are carefully mixed in a mortar with nine pounds of suet. Sixty, one hundred and twenty, or one hundred and eighty grains of this ointment, according to the size of the tumor, are to be rubbed in with an ivory or wooden spatula for about ten minutes, soon after sunrise, and the patient desired to sit with the goitre exposed to the rays of the sun. After six or seven hours' exposure, the pain is often considerable, and the surface generally becomes slightly blistered. Some more ointment is then to be gently spread over the tumor, and the person may be allowed to go home; but he has particular directions not to interfere with the blistered surface, and to attend for a fresh application, if necessary, as soon as the skin has healed. Major Holmes

* The Lancet, p. 438. London, October 10th, 1863.

usually advised that the ointment should be used but once a year to the same patient. Mr. Whishaw, also of Fyzabad, says, that small goitres, such as are seen in England, are cured by one application; but those of larger size require three or four. He mentions the case of a woman, whose goitre measured nearly five feet in circumference, and hung down some inches below her navel. The ointment was used once a month for a year, when she left the hospital, the swelling having been reduced to the size of a small cocoanut. By some of the surgeons of the Indian army it is thought better to employ a stronger ointment than that used by Mr. Holmes. Mr. Greenhow uses one of the strength of an ounce and a half of the salt to three pounds of lard. A modification of this plan appears well deserving of trial, viz., the simple inunction, every other night for some weeks, of the officinal ointment of red iodide of mercury (grs. 16 to the ounce). Care had better be taken not to blister the neck by the too free application of the remedy.

In this country, when medical treatment fails, surgeons have attempted to give relief by one of three operations. Thus, some cases are recorded as having been cured by the introduction of setons into the diseased gland; and in three obstinate cases, which were unrelieved by the iodide of ammonium, iodide of iron, quinine, &c., I effected cures by passing thin double iron wires through the glands, and leaving them there for a week. With other instances, this treatment has failed to effect any good; and unfortunately there are no means by which we can tell beforehand whether the seton will prove beneficial or useless. A little care is necessary in introducing the wires, to prevent enlarged vessels from being pierced. Occasionally the operation of tying the thyroid arteries has been practiced; and these means having failed, attempts have been made to extirpate the gland. To most practitioners, however, the last operation will probably seem unjustifiable.

The peculiar form of this affection which has been named EXOPHTHALMIC BRONCHOCELE, owing to the prominent condition which the eyes assume in it, is a remarkable disease. Not only is there protrusion of the eyeball (proptosis oculi), but generally more or less short-sightedness, so that objects a few yards off cannot be correctly defined, with sometimes a constant and involuntary motion of the eyeball (nystagmus); the thyroid body, as well as being enlarged, is the seat of strong pulsations; whilst the patient suffers from frequent attacks of palpitation of the heart, with occasionally a loud systolic bruit (anæmic?). For our knowledge concerning it, the profession is indebted to the observations of Dr. Stokes, Sir Henry Marsh, Dr. Graves, Dr. Begbie, Von Basedow, &c. Hence, it has been proposed at different times and at different places to name it "Stokes's disease," "Begbie's disease," "Maladie de Graves," and "Morbus Basedowii." There is nothing to be said in favor of this style of nomenclature; and it is to be hoped that its adoption will be checked, since it can only lead to the starting of questions of priority, which are sure not to end in any satisfactory solution.

The triple set of characteristic symptoms must especially be remembered: the exophthalmia, the hypertrophy of the thyroid, and the cardiac palpitation. Both eyes are as a rule, symmetrically affected; while in exaggerated cases, the globe of the eye is only incompletely covered by the lids during sleep. The smooth tumor of the thyroid seems often to rest on the top of the sternum, bulging on each side of the trachea, and usually being more largely developed on the right, than on the left side. Frequently, however, the swelling is less than in ordinary goitre. The hand applied over the gland detects a pulsation or pulsatory thrill, everywhere: the ear,

continued bruit, which is loudest with the systole. The pulsation of the eepseated vessels of the neck is usually visible. In many instances the eart is enlarged; although, at first, the disturbed action of this organ is nerely functional. The tilting of the apex against the walls of the chest eems to be sharper and more apparent than ordinarily. A systolic bruit s often heard at the base of the heart, and in the cervical vessels. The ulse, under the influence of slight excitement, can be at once raised from 0 or 100 to 120 or 130. The general health is always deranged. There s a liability to attacks of giddiness or faintness; the extremities are often chilly; the digestion is disturbed, as shown by a tendency to nausea and diarrhœa; the temper is bad—discontented; the appetite is sometimes voracious, though it frequently fails; and sleeplessness is not uncommon. The termination in recovery may generally be looked for; though it is important to recollect that death has sometimes occurred suddenly as if from serous apoplexy, and sometimes gradually from diarrhœa or exhaustion.

The cause of this disease is unknown. Females, particularly about the time of puberty, are much more liable to it than males. It is not necessarily connected with uterine derangement. Occasionally it has commenced suddenly after a fright. In one instance I could only trace its production to the violent action of an emetic, which was unwisely taken at the commencement of the catamenial flow to relieve pain. The mode of production of the exophthalmia has not been positively determined. It has been attributed to distension of the intraorbital vessels, pressing the eyeball forwards; to serous infiltration of the areolar tissue behind the globe of the eye; or to an increased growth of adipose tissue in the orbit. Whichever may be the correct explanation (the first, or congestive theory, is the most plausible), it usually happens that the ocular prominence and the thyroid tumor increase or diminish simultaneously; although in cases of recovery, the former usually gets more completely cured than the latter. M. Trousseau believes that this complicated affection (which he describes as "La Maladie de Graves," since he says it was first recognized by this distinguished physician in 1835), is a neurosis; being accompanied by local determinations of blood, and having as its proximate cause a modification of the vaso-motory apparatus. This theory explains the occurrence of disturbance in regions supplied by branches from the sympathetic.

In the management of cases of exophthalmic goitre it is above all things necessary to remove the patient out of the way of every insalubrious influence, and if possible to place her residence in some elevated district such as Malvern; to allow an invigorating diet, with plenty of milk, animal food, and cod-liver oil; and at the same time to lessen congestion of the thyroid by such topical applications as ice, cold water douches, and evaporating lotions. The treatment pursued at the principal hydropathic establishments is sometimes especially serviceable. With regard to drugs, more confidence may be placed in digitalis than in any other. Given in full doses, at proper intervals, it calms the cardiac and arterial pulsations, while it seems to impart tone to the heart's walls: its administration is to be stopped when the pulse has fallen to 70. If the practitioner hesitate about this use of the remedy, he may try the effects of the American Wild Cherry (F. 333), the action of which is more gentle. The different preparations of steel have long been recommended, but they do not always agree. With a pulse at 120, a salt of iron will often augment the distress and give rise to urgent dyspnœa. All the iodine and bromine salts prove injurious. They aggravate the exophthalmos, the palpitations and pulsations, as well as the general anæmia; and though they may possibly cause a temporary

diminution in the size of the thyroid, yet this is no sufficient set-off for the mischief they effect.

2. CRETINISM.—This is a strange disease,—a sort of idiocy, accompanied by imperfect development and deformity of the bodily organs, particularly of the head. The disease may be either complete and incurable, or incomplete and curable. Intermediate between these forms there is a degree known as demi-cretinism. Many authorities assert that cretinism has a close but ill-understood connection with goitre. M. Kœberle, of Strasburg, who has written a work on this subject which is highly spoken of, disputes this connection. He attributes the disease to a miasmatic poisoning. Just as some marshy lands produce cholera, some yellow fever, and some ague,—so also he believes that cretinism will arise in certain malarious districts under suitable conditions of temperature and moisture. Dr. Macculloch, some years since, hinted that cretinage had its origin in malaria.* But in my opinion the views of M. Bouchardat approach much nearer to the truth. According to this gentleman, endemic cretinism is chiefly due to two causes acting simultaneously,—the connection of this disease with endemic bronchocele, and consanguineous marriages. In all localities where endemic cretinism prevails, endemic goitre is met with. The goitrous parents have cretinous children, and the offspring of the latter are complete cretins. For bronchocele to be induced a few months' use of impure drinking-water will suffice; but for the production of cretinism it is necessary that insalubrious conditions should extend over several generations. It is certain that most, if not all, cretins are goitrous; though bronchocele is seen to prevail where there are no cretins.

The cretin is found principally in the valleys of the Alps, the Pyrenees, the Andes, and the Himalaya Mountains. In the complete form, the stature is diminutive; the head of great size, flattened at the top, and spread out laterally; the countenance is vacant and void of intelligence; with the nose flat, lips thick, lower jaw elongated, and mouth gaping and slavering. Then the tongue is large, and frequently protruding from the mouth; the eyes are red and watery; often there is squinting; the abdomen is sunken and pendulous; the legs short and curved; while the skin is cadaverous or dark-colored, coarse, and rough. In the females, menstruation comes on at a late period—on an average about the eighteenth year; while in extreme examples of this disease the reproductive powers may remain undeveloped through the whole life. Idiotism of the lowest grade is this cretin's lot. He is deaf and dumb, or blind; often he is voracious; while frequently he is addicted to the most disgusting practices.

Demi-cretins and curable cretins have badly-formed heads, and very limited mental powers. They are neither dumb nor blind; though the faculty of speech may be imperfect. By great care they can be taught a certain amount of self-control. But if neglected, they acquire very filthy habits, like the complete cretins; so as, indeed, more to resemble animals than human beings. I say, if neglected; for, thanks to Dr. Guggenbühl, the founder of the establishment at Abendberg, near Interlachen, for the treatment of cretins, it has been proved that even for these wretched beings much may be done. The chief remedies are pure mountain air; plenty of exercise; a simple nourishing diet into which milk largely enters; wholesome water; the occasional use of such medicines as cod-liver oil, carbonate of iron, phosphate of lime, valerianate of zinc, &c.; with moral control,

* An Essay on Malaria, p. 435. London, 1827.

and judicious mental training.* Dr. Guggenbühl has also directed attention to the highly-arched palate of the idiot, as indicative of atrophy of the base of the brain; just as depression of the vault of the cranium shows imperfect development of the cerebral convolutions. He very properly insists upon the necessity, in training the idiot, of ascertaining the prominent instincts, and the amount of intelligence which exists, so as to encourage those faculties which are not altogether wanting.

XXI. GOUT.

Few disorders have attracted greater attention from ancient and modern physicians than gout.† Sydenham, who was well able to describe its symptoms from a personal experience, inasmuch as he suffered from it for thirty-four years, says that "it kills more rich men than poor, more wise than simple. Great kings, emperors, generals, admirals, and philosophers have all died of gout. Hereby nature shows her impartiality, since those whom she favors in one way she afflicts in another—a mixture of good and evil pre-eminently adapted to our frail mortality." It has long been, and is still, a vulgar error, that an attack of gout is salutary; helping to prolong life and drive away other maladies. The truth is, however, that it produces local and general mischief, which increases with every paroxysm; and though the evil effects may at first be inappreciable, yet the physical powers become gradually undermined. Of course, when the gouty fit is over, the blood is purer, and the patient is in better health than before; but the cause of the attack has produced a permanent and injurious effect,—probably on the kidneys, possibly on the heart.

Gout may be defined, as a specific inflammation, having a constitutional origin, and being much favored by an hereditary taint. It is accompanied by great pain and swelling of the affected joint, fever with general disturbance, and especially by some disorder of the digestive organs. The disease is either acute or chronic. It has a tendency to recur again and again, after variable intervals.

The inflammatory action most frequently invades the ball of the great toe, or the metatarso-phalangeal joint. Thus, out of 516 cases of gout, Sir C. Scudamore found that only the great toe of one foot was affected in 314; the great toe of each foot in 27; the ankle and great toe of the same foot in 11; the outer side of one foot in 10; the instep, one or both, in 31; the

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* An interesting account of this establishment is given by Sir John Forbes, in The Physician's Holiday. Third Edition, p. 180. London, 1852.

It is necessary to mention, however, that since Sir John's visit in 1848, the Institution on the Abendberg has been widely condemned; and it has been asserted, from actual observation, that not only does it fail to fulfil the objects it was established to promote, but that Dr. Guggenbühl's conduct as superintendent is not deserving of professional confidence. At the same time it is allowed that this physician's efforts were at first most disinterested and praiseworthy; and hence it is to be hoped that these efforts will be remembered, while his failings may be forgotten.

† The old Greek physicians named this disorder according to the part affected. Thus they speak of podagra [ποδάγρα, from ποδς = the foot + ἄγρα = a seizure]; chiragra [χειράγρα, from χείρ = the hand]; gonagra [γονάγρα, from γόνυ = the knee]; and arthritis [ἄρθρον = a joint] when several articulations were simultaneously attacked. The term gout seems to have been first used about the year 1270; having been derived from the Fr. *goutte* = a drop, because it was thought to be produced by a humor which fell *goutte à goutte* into the joints.

ankle, one or both, in 47; while in the remainder, the part was either the heel, tendo Achillis, the ham, knee, wrist, thumb, or fingers.

Symptoms.—The *acute* attack may be preceded by premonitory symptoms, or it will come on suddenly. In the former case, the patient complains for two or three days prior to the seizure of more or less dyspepsia, and especially of heartburn with flatulence; of dull pain in the left side of the chest, with inability to lie comfortably on that side; while, in many instances, there is also fluttering irregularity, or intermission, in the heart's action. There are at the same time symptoms of impeded cutaneous action, the skin being dry and hot, and sometimes affected with scaly eruptions or with urticaria; while the urine is loaded with urates.

Very often, however, there is no warning. The victim goes to bed apparently well; but about two or three o'clock in the morning awakes with severe burning and throbbing pain in the ball of the great toe, or in the heel, or the fascia covering the instep of the foot, or the thumb. There is frequently a slight rigor succeeded by heat. The pain is most excruciating, but it abates towards the dawn, and the patient falls asleep. On again awaking, the affected part is seen to be red and swollen, while it is exquisitely tender to the slightest touch; the sufferer is feverish, restless, very irritable, and mentally depressed; his tongue is white and thickly furred; his bowels are constipated; and his urine will be found high-colored, rather scanty, acid, and loaded with urates or with uric acid, sometimes with phosphates or oxalate of lime, while occasionally it contains a little albumen. When the urine presents much uric acid (which is seldom the case) this circumstance is favorable, since it indicates that the kidneys retain their eliminating power; and hence it may be hoped, that the blood becoming quickly freed from the excess of this principle, the patient will soon recover. Often the bladder is irritable, so that it has to be emptied frequently; while the urine in its passage gives rise to a sense of heat in the urethra. On the second night the pain again becomes aggravated; and, perhaps, also on the third. But in a few days the attack passes off, the œdema disappears, the cuticle over the inflamed part desquamates, and the patient regains his usual health. Very frequently he is conscious of feeling better and brighter and more buoyant than he has been for a long time previously; for though the attack may prove permanently somewhat injurious, it is undoubtedly temporarily curative.

With improved strength and spirits, very little attention is paid to hygienic rules. The victim forgets that the disease will return. At first, a happy time of two or three years may elapse. With each paroxysm, however, the interval will shorten; until at length, perhaps, the patient is hardly ever free from an attack, except it may be for a few weeks in summer. At the commencement also, the disease confines itself to a single joint: by degrees, several joints in both feet or in the hands suffer. Deposits (called tophi or tophaceous deposits or chalkstones) are formed around and outside the joints, of a material resembling moist chalk, and consisting chiefly of urate of soda; small spots of which substance can often also be seen just beneath the skin of the auricle of the ear, and less frequently on the eyelids or in the integuments of the face.

The disease is generally spoken of as *chronic* gout when the attacks are almost constant, and the constitution has become impaired by them. The actual pain, perhaps, is not quite so intense as in the acute form; but the distortion and partial or complete anchylosis of the joints, the impairment of the various digestive organs, and the effects upon the kidneys, render these cases very serious. The urine is pale, abundant, and of low specific gravity; the quantity of uric acid is below the healthy average; and there

s often some albumen. As in acute, so in chronic gout, the urea is elimi-nated in due proportion. Every now and then the concretions round the joints give rise to suppuration and ulceration of the skin, and then masses of urate of soda mingled with pus-globules are discharged; such discharges, however, often proving beneficial to the general health, unless the ulceration is extensive.

Complications.—In one variety, called by Cullen *retrocedent* gout, some internal organ becomes affected as the disease disappears from the joints. The term "metastasis," signifying the shifting of the disease from one part of the body to another, is hardly applicable here. The application of cold to a gouty limb is one of the most frequent causes of this mishap.* In cases where the stomach is attacked we find sickness and vomiting, hæmatemesis, violent spasmodic pain, with great distress and anxiety. When the retrocession is to the brain, it produces intense headache, lethargy, and sometimes apoplexy or paralysis. In such instances, the membranes of the brain are probably affected by the gouty inflammation. Dr. Alexander has related a marked example of retrocession to the heart. In this instance, a gentleman, suffering severely from gout, applied some snow to the painful joint. At first relief was experienced, but soon a sense of intense burning and constriction around the lower part of the chest was produced. He then suddenly lost sensibility; and was found sitting in his chair, with an almost imperceptible and slow (40) pulse, tardy catching respiration, and with a deathlike pallid complexion. His recovery was brought about by the free employment of stimulants and counter-irritants.

Diagnosis.—The diagnosis of acute gout is in general simple enough. It is only likely to be confounded with rheumatic fever, but the following distinctions may serve to prevent any error. In gout the blood is impregnated with uric acid, in rheumatism this principle is absent; gouty inflammation is attended with the deposition of urate of soda in the affected tissues, but nothing of the kind occurs in rheumatism; gout occurs mostly in men, rheumatism in men and women equally; and gout at first only attacks one or two joints—usually the ball of the great toe, while rheumatism affects many and large joints. Then lastly, to obviate all chance of error, we ought to take into consideration the general history, with the assigned causes of the disease.

We sometimes meet with puzzling cases, where the gouty diathesis seems to be developed in individuals who never suffer from its local manifestations. Thus many obscure pains, which are often regarded as simple local neuralgiæ, are really mere results of the poison of gout in the system; and this is true with regard to several dyspeptic symptoms, pains in the left side of the chest, palpitations of the heart, difficulties of respiration, attacks of syncope, pulsations in the head with giddiness, imperfect action of the liver, and morbid deposits in the urine. So also, scaly eruptions on the skin, urticaria and eczema, hemorrhagic complaints, pains about the forehead and eyes, occipital headaches, painful congestion of the tip of the nose, or of the lobe of one ear, tonsillitis, bronchitis, toothache, and lumbago, may all be either due to the gouty diathesis, or very materially modified by its existence. The importance of rightly interpreting these

* A filthy practice has oftentimes been adopted, even by individuals who ought to know better, of soaking the gouty limb in urine every night. The patient collects his urine for the twenty-four hours, sometimes adds a little salt or soda to it, and then employs it as a cold foot-bath before going to bed. The most troublesome case of severe pain in the stomach (probably of a gouty character) which has ever fallen under my notice occurred in a man seventy-five years of age, who had adopted this custom for eight months.

symptoms has been particularly insisted upon by Dr. William Gairdner, who believes that the strumous is not more frequent than the gouty habit.

When the health and strength have been much diminished by frequent attacks of regular gout, decided paroxysms are rarely experienced; but the patient suffers severely and frequently from the disease in its irregular forms. The symptoms of anomalous, or misplaced, or atonic gout are then chiefly as follows: Painful dyspepsia, with heartburn, flatulency, acid eructations, piles, and constipation; frequent attacks of faintness, and palpitation of the heart; nervous weakness, and great irritability of temper, so that the patient is feared by his relatives, who too seldom make allowance for his weakness and sufferings; frontal headache, with pain in the occiput and nape of the neck; as well as frequent flushings of the cheeks, and sometimes transient attacks of heat, and redness about the nose. Moreover, there is often irritability of the bladder, with scanty high-colored urine; diminished strength, so that a little exercise fatigues, and noise or bustle alarms; a desire for quiet and seclusion; susceptibility to every atmospheric change; and frequent annoying neuralgic pains, with cramps, and an irresistible desire to grind the teeth. Sometimes the teeth are thus actually worn down to the sockets, the uneasy sensations being only alleviated by forcibly grinding them together. As these symptoms continue, the debility becomes greater, until the entire system is ruined. And then, ultimately, the patient either dies from apoplexy, or from hydrothorax, or from pulmonary congestion, caused by the disturbance of the heart's action; or from ascites, due to disease of the liver and kidneys; or even, perhaps, suddenly, from profound syncope; or he gradually sinks exhausted and imbecile.

Causes.—Women are much less liable to this disease than men. It generally begins between thirty and forty years of age, few first attacks being witnessed before twenty, or after sixty. It is very often hereditary. But undoubtedly gout is frequently acquired by a luxurious mode of living, sedentary habits, and overmental toil and anxiety—especially when stimulants are resorted to for the purpose of making such toil more supportable. Where a predisposition to the disease can be traced from the parents or grandparents, it usually first appears at an earlier time of life than when it has been acquired.

Gout is especially induced by the use of port wine, sherry, strong ale, and porter. In many instances, Madeira, champagne, Burgundy, cider, and perry have a similar influence. An undue quantity of animal food and overrich diet are frequent causes, especially when combined with the employment of port, sherry, &c. Alcohol in the form of distilled spirits (particularly gin and whisky) has but little effect in producing it: rum is possibly an exception to this rule. In Scotland, where whisky is the chief drink, gout is very seldom seen; those who take this beverage to excess being punished by other and even more painfully fatal diseases. Everything which, by inducing mal-assimilation of the food, leads to the formation of an excess of uric acid in the blood is an important cause. Thus, all depressing influences—great fatigue, the shock of an accident, a simple blow or fall, cold and damp, venereal excesses, dyspepsia, hemorrhage, mental anxiety, poverty, &c., may produce an attack in one predisposed. The spring is the season in which the disease is most apt to occur, while the autumn ranks second. Plumbers, painters, and others, who become the subjects of lead poisoning, seem to be particularly predisposed to gout.

Morbid Anatomy.—On examining the bodies of those who have died after repeated attacks of gouty inflammation, we shall often find important

hanges in the joints which have been affected, as well as in some of the nternal organs.

Now as to the joints, it must be recollected that they are frequently more or less completely anchylosed. Around and within them is the chalky matter (urate of soda), the deposition of which forms the characteristic feature of gouty inflammation; the amount of this salt varying in quantity, but often being so abundant as to produce considerable swelling and distortion. The articulations may even appear as if set in plaster. The synovial fluid is thick and creamy-looking. The ligaments are rigid and contracted. Repeatedly too, the cartilages are quite destroyed, and the bones denuded.

With regard to the internal structures it may be said that we often find morbid appearances in the heart, lungs, coats of bloodvessels, and membranes of the brain. But in these changes there is nothing characteristic of the disease under consideration, and it is probable that they are accidental complications. The kidneys appear to be the organs which are specially affected. Several years ago Dr. R. B. Todd drew attention to the condition of these glands in chronic gout. The gouty kidney is found contracted to one-half or one-third its usual size; and it has a shrivelled appearance. The capsule is thickened and opaque, and the surface is granular. The decrease in size takes place at the expense of the cortical portion. On making a section of a gouty kidney several white streaks can sometimes be seen, chiefly running in the direction of the tubes of the pyramidal portion; which streaks, when microscopically examined, are found to consist of crystals of urate of soda. The urine in these cases is generally natural in quantity, pale in color, of low specific gravity, and contains a variable quantity of albumen. There may be also more or less dropsy with this condition; while the cases frequently end in uræmic convulsions, delirium, and coma.

A contracted kidney, with albuminous urine and granular and waxy casts, is found in other disorders besides gout; but it is only in this affection that there exists the deposit of urate of soda.

Pathology.—If we analyze the blood in gout we shall find the red globules in their normal proportion, unless the attack has been long and has much depressed the patient, or unless the disease has occurred in a previously debilitated subject. Under either of these circumstances the colored corpuscles may be considerably diminished. The fibrin is increased in quantity if the local inflammatory action has been severe; so that it may be augmented to five or six parts in 1000, as happens also in non-specific inflammations. The specific gravity of the serum is lowered in the cases where the disease has been of long standing, as well as in those accompanied with albuminuria; but the important point with regard to the serum is this,—that it invariably contains uric acid in the form of urate of soda in an abnormal quantity. Dr. Garrod points out that in health the merest traces of both uric acid and urea can be detected by very great care in manipulation; but this trace is by no means sufficient to be discovered by the thread experiment. This gentleman says that in several experiments on the blood in gout and albuminuria, where quantitative determinations were made, the amount of uric acid in the 1000 grains of serum was found to vary from 0.025 to 0.175 grain. Hence it seems probable, to say the least, that in uric acid we have found the actual materies morbi.*

* *Dr. Garrod's Plan of Ascertaining the Presence of an Abnormal Quantity of Uric Acid in the Serum of the Blood.*—Take about two drachms of the serum and place it in a flat glass dish or watch-glass. To this add twelve drops of ordinary strong acetic acid, which will cause the evolution of a few bubbles of gas. When the fluids are

The amount of uric acid daily eliminated by the kidneys in health is about eight grains; and it can easily be understood that the same effect ensues from these organs performing their office inefficiently, as from the formation of an increased quantity of this salt in the system. Not that the mere accumulation of urate of soda in the blood will produce the phenomena of gout. For, as Dr. Garrod says,* "the poison may lie dormant for a considerable time; but when crystallization of the salt takes place in any tissue, inflammation is suddenly lit up by its presence, and a paroxysm of gout ensues."

Treatment.—The treatment of gout naturally divides itself into that proper during an attack, and that to be adopted in the interval. That this malady is curable there can be no doubt, though it has been (and as Dr. William Gairdner insists, ever will be) the *opprobrium medicorum*, where extirpation by means of the medicines of the Pharmacopœia is only aimed at. The fit may be postponed, mitigated, and often shortened by drugs; but only temporary relief from this source must be looked for. At the same time it should not be thought that Cullen's remedies—patience and flannel—are to be trusted to.

It is generally considered that *bleeding* during an *acute* attack is unnecessary. Dr. Gairdner well observes: "I am convinced that bleedings to such an amount as is necessary to subdue inflammation, are much to be avoided in gout. Those who prescribe them will not fail to find out, in a very short time, particularly in London practice, that they have sacrificed their best resource in the cure, namely, the strength of the patient; and have made a lengthened and distressing case, where they meant to make a short and brilliant cure."† Although, however, depletion is in every way contraindicated, yet this physician states that he has often found a very small bloodletting (three to six ounces) productive of the greatest good by relieving the overloaded heart and congested vessels; but he never makes use of this remedy where the constitution is impaired or defective. Leeches are sometimes applied to gouty joints; though for my own part I confess that I have very rarely seen any benefit result from the practice.

Laxatives must almost always be employed; not violent, but mild, warm aperients, such as aloes, senna, rhubarb, jalap, &c. A mixture of equal parts of the compound infusion of gentian and infusion of senna (the compound gentian mixture of the London Pharmacopœia) will agree well; as will Pullna water, or any one of the preparations to be found under the heads of F. 144, 145, 146, 148, 149, 151, &c. Anthony White, who had much experience in the treatment of this disease, maintained that the liver was the organ in which the poison of gout got elaborated; and hence he believed that the physician's chief object should be to restore the natural functions of this gland, as indicated by a copious discharge of bile through the bowels. He relied almost exclusively on the use of a pill made of one grain each of calomel, colchicum, aloes, and ipecacuanha, which at

mixed, introduce two or three threads of cotton, or one or two ultimate fibres from a piece of unwashed huckaback. Allow the glass to stand on the mantel-piece, or on a shelf in a warm room, for from thirty-six to sixty hours, until its contents set, from evaporation. If the cotton fibres be then removed and examined microscopically with an inch object-glass, they will be found covered with crystals of uric acid, if this agent be unduly present in the serum. The crystals form on the thread somewhat like the masses of sugar-candy on string. Hence this process is termed "the uric acid thread experiment."

* The Nature and Treatment of Gout and Rheumatic Gout. Second Edition, p. 333. London, 1863.

† On Gout: its History, its Causes, and its Cure. Fourth Edition, p. 307. London, 1860.

st was given six times a day, and afterwards every eight, or twelve, or enty-four hours, according to circumstances. But though this eminent rgeon's pathology was wrong, yet it is certain his remedies often did good; id consequently where there is hepatic congestion, with urine free from bumen, his pill may be prescribed. When, however, the kidneys are ffected, no preparation of mercury should be given; for not only will nall doses of this metal be apt to produce severe salivation, but they eriously impoverish the already deteriorated blood.

With regard to *diuretics* and *diaphoretics* there can be no doubt they often afford great relief. Hence we should give the acetate, citrate, or bicarbonate of potash; we can administer some preparation of opium; and often we may employ the hot air or the vapor bath with advantage. But in all cases, speaking generally, with these remedies we must combine *colchicum*, since there are many reasons for believing that this drug may be regarded as a specific for the gouty paroxysm. It ought not to be administered until the bowels have been well opened; and it must be given not (as often recommended) so as to gripe and purge, but in small quantities, easily borne without pain or inconvenience. At the commencement, one full dose should be exhibited—such as from two to three grains of the acetic extract; and then ten or fifteen minims of the wine of colchicum, or of the tincture of the seeds, three times a day, in Vichy water, or with sedatives and alkalies, or with iodide of potassium, will often suffice (F. 31, 46, 212, 351, 352).

Narcotics generally do harm by diminishing the secretions, though they cannot be withheld where the pain is very great. Henbane is less efficacious than opium, but it will also prove less injurious by not interfering with the secretion of bile. A combination of opium and belladonna (F. 344), or of morphia and chloroform and Indian hemp (F. 317), can be recommended. Eight or ten grains of the extract of hyoscyamus, or one fluid drachm of the tincture, are the smallest doses from which any appreciable effect of this drug can be expected.*

With regard to *general rules*, it is to be noticed that the patient should be confined to his bed, at all events for the first few days. The affected limb must be kept elevated and warm. The painful part ought to be covered with cotton-wool and oiled silk; or else with an anodyne lotion (F. 265, 267, 297); or with a poultice on which some extract of belladonna has been freely spread, or some tincture of opium sprinkled. It is only in cases of chronic gout that small blisters can be of any service. If the foregoing local remedies give but little relief, they will do no harm, which is more than can be said of cold applications. Several cases are known where death has occurred in a few hours, from patients plunging their feet into cold water with the idea of cutting short the fit. And lastly, during the early stages the diet should be light, consisting chiefly of milk,

* Many patients have told me that they have benefited by the use of the anti-gout liquid and pills of Dr. Laville. From an analysis, the *liquid* would appear to owe its properties to the active principle of colocynth, quinine, and cinchonine, with unimportant salts of lime. It is used at any period of the attack; a teaspoonful being taken in sugared water or tea, and repeated in six or seven hours if the pain continue or the bowels be not moved. Then twenty-four hours are to elapse before the next dose; when half the quantity may be employed daily for two or three times, unless the bowels are irritable. The *pills* consist of a peculiar extract called physalin (obtained from the Physalis alkekengi, or winter cherry, a perennial herbaceous plant belonging to the natural order Solanaceæ), and of silicate of soda. They are employed to remove all traces of the disease, as well as to prevent future attacks. Of an alterative nature, one is taken at the commencement of a meal once or twice a day; sometimes being continued thus for many weeks.

arrowroot, tapioca, tea, &c. Diluents may be taken freely with considerable advantage: none being better than barley, or toast, or plain water, or Seltzer, or soda, or Vichy water. Much mischief results from allowing animal food too soon. But when the fever has sensibly diminished, and the powers of digestion are strong enough, beef tea, white fish, poultry, and mutton may be gradually allowed, with, perhaps, one glass of good sherry or a tablespoonful of whisky well diluted.

The most important question still remains, *How are we to prevent the return of gout?* Clearly, by enforcing the observance of a well-regulated diet; by exchanging a life of indolence for one of bodily activity; by adopting early and regular hours; by avoiding too great sexual indulgence, as well as by omitting all severe mental application; and by the aid of medicine. Moderate exercise in the pure air; warm, tepid, or sea-water baths; and the fostering of a tranquil disposition,—these are remedies not to be despised. Starving the disease will not cure it. An animal and vegetable diet should be used; the point being to take care, that both as regards quantity and quality, the stomach can digest, and can consequently extract healthy chyle from the materials put into it. Salt meats have only the recommendation mentioned by Montaigne's friend, "that he must needs have something to quarrel with in the extremity of his pain, and that he fancied that railing at and cursing, one while the Bologna sausages, and at another the dried tongues, and the hams, was some mitigation to his torments." Ale, porter, port wine, sherry, marsala, madeira, are certainly injurious, but whisky or gin and water may sometimes be allowed. It is very probable, also, that a moderate quantity of some light wines, such as claret, hock, chablis, dry champagne, &c., will prove of occasional service rather than otherwise. The best medicines are an antacid purgative at intervals, and some of the neutral salts frequently used. The citrate or tartrate of potash or the phosphate of soda are valuable remedies, taken in very small doses, in half a pint of water, once or twice a day; or one or two bottles of Vichy water, or soda or potash water, can be drunk in the twenty-four hours; or a tumblerful of a weak infusion of the leaves of the Fraxinus excelsior or common ash (one ounce of the leaves infused in a pint and a half of water) may be taken on an empty stomach, night and morning. During the last four or five years Dr. Garrod has made many trials of *carbonate of lithia* as an internal remedy, both in cases of the uric acid diathesis connected with gravel, and in chronic gout (F. 64). When given internally, in doses of from three to six grains dissolved in plenty of simple water, or of aerated water, and repeated two or three times a day, in patients voiding uric acid gravel, it causes the deposits to become less, or even to cease altogether. If a large amount of alkali be desirable, the carbonate of lithia may be prescribed in combination with the carbonate or citrate of potash. My own experience with this remedy has not been small; but it is difficult to say much either for or against its employment.

In *chronic gout* the blood is to be purified and kept pure. With this object we must regulate the diet, and prevent indigestion; maintain the proper action of the bowels and skin; and trust to such remedies as colchicum, alkalies, iodide of potassium, chlorate of potash, &c. Guaiacum is now and then recommended, though it is not deserving of the slightest confidence. The supply of animal food is to be limited; but white fish, milk, and eggs prove beneficial. Malt liquors and port wine must be strictly forbidden, even a little dry sherry or brandy and water being scarcely permissible. In weakly subjects, when the disease lingers about the system, mild vegetable tonics—such as quassia, calumba, gentian, or bark, do much good. The efficacy of quinine (except in combination with colchicum) is doubtful; and

from an anæmic condition iron be indicated, only small doses of some ild preparation ought to be employed (F. 394, 403, 404, &c.). The terative and tonic effects of arsenic have led me sometimes to use this etal with benefit, administering it either alone, or with colchicum, or the dide of potassium, or steel (F. 52, 399, 402).

As a rule, the collections of chalkstones should not be opened, unless om their size the skin is about to ulcerate. If the knife be used, the nallest opening which will permit of the escape of the creamy fluid ought ɔ be made; otherwise an obstinate sore may result. Mr. Spencer Wells tates that these accumulations can be often dispersed by the administration ɔf the iodide of potassium, which possesses the power of dissolving urate of soda; while local friction, with the same salt or with the iodide of ammonium (F. 280), will often do good.

For attacks of *irregular* or *misplaced gout*, salines and colchicum are generally needed; while we should try to bring the disease to the extremities by mustard pediluvia, &c. With regard to *retrocedent gout* we must especially avoid cold, as this is often the cause of the mischief. Antispasmodics are the remedies which give most relief; chloroform, ether, ammonia, and brandy being often needed. If the stomach be affected, vomiting does good, and afterwards a sinapism or turpentine stupe should be applied over the epigastrium. Warmth or counter-irritation ought also to be employed to the joints, so as to bring back the inflammation.

After an attack of gout in any shape, a wise patient will take a thorough holiday. A visit to some of the mineral waters—to Bath (F. 460), Buxton (F. 464), Cheltenham (F. 461), Harrogate (F. 466), or Leamington (F. 463); or for a greater, and therefore perhaps better change, to Wiesbaden (F. 489), Vichy (F. 479), Carlsbad (F. 496), or Aix-la-Chapelle (F. 483), will be productive of the greatest benefit. The mineral waters of any of these springs may be employed, always provided the patient has no symptom of any impending attack, nor any disease of the kidneys or of the heart. But I believe that these remedies are chiefly of use in so far as they improve the general health; though it is said that an annual residence at Vichy for three weeks will keep many a gouty man free from his enemy for the rest of the year.

XXII. RHEUMATISM.

Rheumatism [*Ρευματισμὸς* = a flux or looseness; *ῥευματίζομαι* = to be affected with looseness, from *ῥεῦμα* = a humor floating in the body causing disease] is one of the most common, painful, and severe diseases of this country. It arises from some unknown abnormal condition of the blood. The action of the poison is not limited to any one texture or organ; although it particularly affects the white fibrous tissue which enters into the formation of the aponeurotic sheaths and fasciæ, ligaments and tendons, as well as the fibro-serous membranes. Consequently the parts most frequently involved are the joints and surrounding structures, with the pericardium and endocardium. There are two very distinct forms of rheumatism, the acute and chronic.

1. **ACUTE RHEUMATISM.**—Acute rheumatism, or rheumatic fever, is a disease characterized by fever, profuse acid sweats, and inflammation of the fibrous tissues surrounding one or several of the large joints. It is

especially formidable from the suffering it causes, from the intensity of the fever, and from the damage which is so frequently produced by it to the heart. When the febrile action is very slight, and the inflammation of a moderate or mild character, the disease is generally spoken of as subacute rheumatism.

Symptoms.—The earliest symptoms of acute rheumatism are mostly restlessness and fever; succeeded at the end of some twenty-four or thirty-six hours by stiffness with aching pain in the limbs and joints. These indications of coming mischief usually follow exposure to cold and damp, and similar depressing influences. The pain quickly increases; and in a very short time is accompanied by swelling and great tenderness of one or more of the large joints, together with high fever and much constitutional disturbance. When the disease is established, the patient presents a pitiable spectacle of helpless suffering. He is very restless, yet dare not or even cannot move: the pain in the affected joints is so agonizing, that the weight of the bedclothes can barely be borne. The face is flushed, hot, and moist. The skin is generally bathed in sweat; which has a very disagreeable acid or sour odor, and which reddens litmus-paper. The temperature in the axilla varies, at different times in the day, perhaps from 100° Fahr. to 102° or 103°. Where it rises as high as 105° the danger is decidedly very great; while in cases about to end fatally it has reached even to 109° and 110°. The pulse is frequent and large, hard and quick; but it continues regular in uncomplicated cases. The thirst is extreme, and often insatiable. There is usually constipation, but occasionally the bowels are much relaxed. The tongue is moist, but white and thickly furred; while the saliva is acid. The urine is high-colored, scanty, of high specific gravity, very acid, with perhaps scarcely a trace of chlorine, and loaded with uric acid, or more frequently with urates. It has lately been shown that the deposits formerly regarded as consisting of urate of ammonia have a variable composition, being made up of the urates or lithates of lime, potash, and soda.* Relapses are very common. A chemical analysis of the blood shows the presence of a superabundance of fibrin (hyperinosis), with a deficient amount of salts and red corpuscles.

A remarkable feature in this disease is the great tendency to metastasis. Thus, the inflammation may suddenly leave one joint and appear in another, and then in a third, afterwards jumping back again to its original seat. But the most serious change is when it shifts its place, or extends, to the membranes of the heart. This it is most likely to do in severe cases, when we may suppose the blood to be loaded with the materies morbi; in young persons; and when the irritability of the heart is great, as it is after bleeding and excessive prostration. Since, however, rheumatic pericarditis and rheumatic endocarditis do not differ from simple inflammation of the pericardium or heart—except perhaps in being less fatal—I shall defer further notice of the signs of these affections until treating of the diseases of the heart generally. Here it need only be urged, that as these complications are much to be feared, the existence or absence of a friction-sound, or of an endocardial murmur, should be determined once or twice daily by a careful examination. Occasionally, the cardiac affection precedes the articular, even by a few days. Moreover, in addition to pericarditis and endocarditis, carditis or inflammation of the walls of the heart will possibly set in;

* Urine containing an excess of urates may be distinguished by its high color, increased density, and turbid appearance when cold—somewhat resembling pea-soup. On applying heat to a portion in a test-tube, it becomes bright and clear. Examined by the microscope, an abundant amorphous material is seen.

small vegetations or fibrinous concretions can occasionally be produced the valves or lining membrane independently of inflammation.

Rheumatic fever may also, but more rarely, be complicated with bronitis, pleurisy, pneumonia, or even with inflammation of the brain or its mbranes; while very rarely the local effects are such as to lead to disornization of one or more of the affected joints. An attack now and then lows scarlet fever. Moreover, we sometimes meet with cases, especially ıere the heart has become implicated, in which irregular choreal moveents come on during the progress of the disease. This complication is ost likely to arise when the patient has become much depressed, and when ıerefore the irritability of the nervous system is increased.

Whenever rheumatic fever is uncomplicated, its average duration under ıroper treatment is from twelve or sixteen to twenty-five or thirty da In those cases which end fatally, death is almost always due to the cardiac inflammation. According to the reports of the Registrar-General the deaths from "rheumatism" in England, during the year 1866, were $\frac{\text{Males } 1180}{\text{Females } 1158} =$ 2338. Taking the returns for the last ten years, this number may be said to be about the average. And considering that these figures apply to the direct mortality of the disease, they are larger than might be expected. What the indirect fatality may be we have no means of learning. When recovery takes place after the heart has been affected, the patient has very often a sad time in store for him,—future bad health, palpitation on any excitement, attacks of dyspnœa, incapacity for any exertion, and dropsy. By far the greater number of cases of acute rheumatism occur in persons between fifteen and fifty years of age, this disease being equally rare in the very young and very old. Undoubtedly it is sometimes hereditary. Damp and variable weather will be found to have a greater influence in causing acute rheumatism, than either extreme cold or heat.

Pathology.—Dr. Prout first suggested that the presence of a superabundance of lactic acid in the system was the cause of rheumatic fever; a view which has been since entertained by many authors. Dr. Richardson (following the example of Mr. John Simon and Dr. Brinton) has made an interesting series of experiments; from which he infers that "lactic acid has the power, when existing in an animal body in excess, of producing a class of symptoms attaching themselves mainly to the fibro-serous textures, and which, regarded in all points of view, are essentially the symptoms of acute rheumatic inflammation."* Thus, he injected into the peritoneum of a healthy cat, seven drachms of a solution of lactic acid mixed with eight of water. Two hours after the operation the action of the heart became irregular; in four hours more the animal was left for the night; and in the morning it was found dead. The inspection showed no peritoneal mischief; but there was the most marked endocarditis of the left cavities of the heart. The mitral valve, thickened and inflamed, had become coated on its free borders with firm fibrinous deposit. The whole endocardial surface of the ventricle was intensely vascular. Upon repeating the experiment on a dog, the inspection revealed the most striking pathological signs of endocarditis. The tricuspid valve was inflamed and swollen to twice its ordinary size. The aortic valve, swollen and inflamed, was coated on its free border with fibrinous beads. The endocardial surface was generally red from vascularity. The pericardium was dry and injected. As before, the peritoneum escaped injury. The joints were not attacked, but there was distinct sclerotitis in the left eye. Again, in a third instance not only did endocarditis result, but there was well-marked vascularity of the sclerotic, and

* The Cause of the Coagulation of the Blood, p. 389. London, 1858.

various joints were affected; while there was metastasis, now one joint suffering, then another, and again the heart. As Dr. Richardson remarks, it has yet to be learned by experiment whether acids of an analogous character to the lactic—such as formic, acetic, lithic, and butyric—are capable of producing the same results.

In rheumatic endocarditis, the left side of the heart only is affected as a general rule. Hence, Dr. Richardson infers that the chemical change whereby the morbid matter of acute rheumatism is produced, is completed in the pulmonic circuit; that in the respiratory act the *acid* quality of the poison is produced; that thus formed, the poison is carried by the arterial circulation to be disposed of by decomposition, or elimination, or both; and that it does not return as an acid by the veins, but simply as a product which admits of retransformation in the pulmonic circuit into the acid state.

Regarding the origin of the lactic acid, Dr. Headland suggests that ordinarily the starch of the food is first converted into this agent, which then combines with oxygen to form carbonic acid and water, in which state it is excreted by the lungs; but that under conditions unfavorable to this oxidation, the lactic acid accumulates in the system.

Treatment.—A vast number of different plans have been recommended. And considering that this disease has a strong tendency to terminate favorably, it is not surprising that each authority can adduce numerous successful cases in proof of the efficacy of the drugs he employs.

Remembering the high fever and severe pain which accompany acute rheumatism, it can readily be anticipated that *venesection* has long been advocated. But most physicians are now agreed that bloodletting will merely give temporary relief, at the expense of future suffering; while recollecting also that it increases the irritability of the heart, and consequently predisposes to rheumatic inflammation of this organ, I should, as a rule, never resort to it. The use of large *blisters*, applied completely round the limb and close to the affected joints, has been strongly advocated by Dr. Herbert Davies; their application being followed by the employment of large linseed poultices to promote the discharge of serum. No medicines are to be given. If the evidence of patients is of any value, this practice must be considered as a very successful one. Moreover, I know of one or two medical men, who, having had personal experience of it, are almost enthusiastic in their praises. According to their testimony, the speedy relief to pain is most marked; while the duration of the attack is greatly shortened. *Saline purgatives* (F. 141, 144, 152, 165, 169), given so as to obtain one free evacuation daily, will be beneficial; especially after the bowels have been well acted on by a large dose of calomel and jalap (F. 140). *Opiates* in full doses are frequently necessary to relieve the pain, and to allay the general irritability. They will also help to encourage sweating, and thus aid nature in eliminating the poison by the skin. Two grains of extract of opium, with one-third of a grain of extract of belladonna, may be given every night; and unless the skin acts freely, five grains of the compound ipecacuanha powder every four or six hours will do good. The efficacy of the latter will be increased if the nitrate of potash be substituted for the sulphate in making it (F. 213). *Quinine* in large doses has been used by some physicians, but I am not in a position to speak of its effects. In combination with iodide of potassium (two grains of quinine to four or five of the iodide, repeated thrice daily) it is sometimes useful at a late stage of the disease. The *American Hellebore* (F. 321) is spoken highly of, as an arterial sedative; and has been employed in acute rheumatism with advantage. The *Nitrate of Potash* is said by Dr. Basham to

the most efficacious remedy with which he is acquainted. Its action is is explained: The blood in acute rheumatism contains excess of fibrin d diminution of salts; it has, moreover, an increased tendency to the mation of exudatory products, the most dangerous of which occur in the art and on its valves. As the nitrate of potash is known to have the operty of preventing the separation of fibrin from the blood, it is rational infer that it will prevent exudatory formations which consist of fibrin. inical observation, it is said, proves this view to be correct. The treatent adopted by Dr. Basham is to give a solution of nitre, *ad libitum*, to llay thirst; and also to apply it externally to the joints. Patients will ometimes take 480 grains in twenty-four hours. This remedy is preferred o the alkaline carbonates from being less liable to cause gastric derangements. And then, *Lemon-juice*, in two or three ounce doses, repeated three or four times a day, has been recommended by Dr. Owen Rees; who considers that the citric acid undergoes changes in the stomach, supplying oxygen to such elements as tend to produce uric acid, and inducing thereby the formation of urea and carbonic acid instead. The result of its use, however, has not been such as to make me recommend it; for I have not only found it fail to do as much good as other remedies in the few instances in which I have tried it, but more than once alarming depression has been caused.

The treatment which I believe to be the best, under ordinary circumstances, remains for consideration. Essentially, the plan is the same as that advised by Dr. Garrod, Dr. Fuller, &c. It consists in relieving the pain by opium and belladonna, while the alkalies and their salts are freely administered to correct the abnormal condition of the blood and excretions. Thus, from twenty to sixty grains of the bicarbonate of soda or potash can well be given every three or four hours, in half a bottle of soda water, or in an effervescing citrate of ammonia or potash draught; continuing it regularly until the articular affection and febrile disturbance are very much lessened, till the pulse is reduced, and the urine rendered alkaline. If the patient be robust, and the urine continues much loaded with urates, ten minims of the wine of colchicum should be added to each draught. Or if the disease remain stationary in one or two joints, from three to five grains of iodide of potassium may be advantageously administered with each dose. So also the hot air or vapor bath can be simultaneously employed, if the perspiration be scanty; though the necessity for such baths is quite exceptional. During convalescence, few medicines will do so much good as bark and ammonia (F. 371); with subsequently some mild preparation of steel (F. 403). Cod-liver oil is often of service directly the acute symptoms subside, and sometimes even before they do so.

The *diet* must at first be low, consisting of slops, arrowroot, mutton broth, &c. Directly there are signs of depression, good beef tea, raw eggs in tea, milk and lime-water (F. 14), or prepared milk (F. 15), may be administered; with, if necessary, ammonia and spirit of chloroform in soda-water. Light puddings, potatoes, and white fish should be allowed as soon as the appetite returns, and the stomach appears capable of digesting them; while mutton, poultry, game, and beef ought not to be given until convalescence is thoroughly established. During the early stages, when there is much thirst, a refreshing saline drink (F. 355, 356, 360) will be beneficial; or plenty of soda or potash water, or good lemonade may be allowed. Sugar is bad for the dyspeptic, the gouty, and the rheumatic; since it is transformed into fat, lactic acid, and other substances which readily disagree with the organs of digestion. Malt liquors and most kinds of wine are

equally injurious. Moreover perfect rest must in every case be enjoined, and all sources of mental anxiety should if possible be removed.

With regard to *local remedies* it is to be remembered that great relief is often experienced from wrapping the affected joints in cotton-wool and oiled silk, by which a sort of local vapor bath is formed. So, when the wrists or ankles are chiefly affected, I have seen benefit arise from frequently soaking them in a hot alkaline bath; or from fomenting them with water to which a mixture of the bicarbonate of soda and opium has been freely added. Where the acute symptoms have partially subsided, small blisters, the size of a penny piece, may be advantageously applied; or the swollen joints can be painted with iodine (F. 205), and then covered with wool. In every case it will be far better for the patient to sleep between blankets, rather than to have linen or calico sheets: inasmuch as the latter soon get damp and cold from the perspiration.

Supposing any of the signs of cardiac affection (such as violent and irregular action of the heart, præcordial pain, enlargement of the normal area of dulness, friction-sounds or bruits, dyspnœa, and fever) manifest themselves, what is to be done? Most authors say, apply leeches over the region of the heart or resort to general bleeding, and quickly get the system under the influence of mercury. If the remarks which have been made in the section on inflammation, however, are true, no such remedies will be necessary. Believing them to be correct, I consider that it is much better merely to get freedom from pain by full doses of opium, to apply hot moist linseed or mustard poultices over the cardiac region, and to continue the bicarbonate of soda or potash draughts. Where the action of the skin appears at all insufficient, the vapor bath should be employed. Perfect rest and abstinence are also needed; but the practitioner must not be overcautious in allowing good soups and broths, milk and raw eggs, orange-juice and cod-liver oil, as soon as the powers of life appear to be failing. I have now been able fully to carry out this plan in many severe cases of rheumatic pericarditis; and the comparatively rapid recovery of these patients, together with the general train of symptoms during the treatment, has convinced me that it is to be strongly recommended. Should effusion take place into the pericardium, the application of a blister, or of a succession of blisters, will possibly do good; and perhaps diuretics, with the iodide of potassium, may in certain instances be beneficial.

2. CHRONIC RHEUMATISM.—This is sometimes the sequel of rheumatic fever, but more frequently I believe a separate constitutional affection, coming on quite independently of any previous acute attack. During the decline of life it is common, not very many old people being altogether ignorant of its symptoms. A peculiar form is apt to complicate, or to follow gonorrhœa; hence one variety of this disease has been termed *gonorrhœal* rheumatism.

The fibrous textures around the joints, or the fibrous envelopes of the nerves, or the aponeurotic sheaths of the muscles, the fasciæ and tendons, or the periosteum, are the parts that suffer in chronic rheumatism. Whichever tissue may be affected, there is, at first, only slight constitutional disturbance; but the sufferer is constantly annoyed, and his existence at length made miserable with wearying pains, causing him to be restless at night, and destroying all comfort during the day. In some instances the pains are worse at night, being aggravated by the warmth of the bed; with others warmth affords the greatest relief: the former is usually the case when the blood is circulating a poisonous material through the system, as in venereal rheumatism, or in that due to derangement of the digestive

organs and secretions; the latter, in rheumatism of an erratic kind, dependent on exposure to damp and cold, &c.

There are two or three different *forms* of chronic rheumatism. Thus, rheumatic inflammation of the lumbar fascia is termed *lumbago;* the pain being referred to the fleshy mass of muscles on one or both sides of the loins, being very severe, and being increased by every movement of the back. *Stiff* or *wry neck* is another variety, generally due to sitting in a draught. To relax the painful muscles the patient inclines his head to the affected side; and as the muscles soon become rigid, the proper position is not regained without a sharp twinge. *Synovial rheumatism* is that kind in which the morbid action especially favors the thin and delicate membrane covering the articular extremities of the bones; thus causing an excessive formation of viscid and glairy fluid in the closed synovial sacs. It affects most frequently the knee-joint, the synovial membrane of this part being the largest in the body. In *sciatica* the suffering is due to disease affecting the neurilemma of the sciatic nerve; but it will be more correct to treat of this kind in describing the forms of neuralgia, than in the present section. When the intercostal muscles, or the fibrous fasciæ lining the chest, are affected, the disease is often called *pleurodynia.* The "stitch" which follows a deep inspiration must not be mistaken for the lancinating pain of pleurisy. And lastly, in *rheumatic ophthalmia* there is acute inflammation of the sclerotic, which is always attended with some amount of fever and constitutional disturbance, as well as with more or less severe nocturnal pains about the orbit and temple.

The *diagnosis* of chronic rheumatism is generally easy. There are, however, certain painful muscular affections which sometimes simulate it. These pains (technically *myalgia*) are familiar to us all as "soreness and stiffness," following upon some extraordinary exertion, but they are not always as readily recognized when they occur during convalescence from any long illness. Yet it is clear, that the mere sitting upright in a chair, without any support for the head or arms, may be as fatiguing to some of the muscles (the trapezius amongst others) of an invalid, as the attempt to ascend Mount Blanc would prove to an ordinary gentleman only accustomed to a daily desultory saunter through the London parks. Muscular pains of this nature are not uncommon also in persons suffering from general debility. They have their seat in the fleshy parts of muscles, in their tendinous prolongations, or in the fibrous aponeuroses. Dr. Inman, of Liverpool, in a pamphlet on this subject, states that they are usually described as hot or burning; they are absent on rising in the morning, and increase with fatigue; the pain is referred to some muscle or its tendon, and is relieved by relaxing or supporting this muscle; the pulse is generally weak and fast, but is unaffected by the pain; and the patient frequently suffers from cramps. Now the diagnosis is important. For if we hesitate to administer ferruginuous tonics and nourishing diet, or to afford proper rest and support to the weak muscles until they regain their tone, we shall fail to give any relief to the poor sufferer, who will either be haunted continually by the idea that he bears about him some incurable disease, or more wisely, in his justifiable contempt for medicine, will hasten to try the good diet and pure air of some hydropathic establishment, where he will certainly get well "after being given over by the faculty."

Another disorder which has sometimes been mistaken for chronic rheumatism is *acute mollities ossium.* The latter usually commences with weakness, weariness, and pains in the limbs. But in this disease of the bones the suffering is much more severe, and more lasting; while, after a time, the softening of the osseous tissue and the accumulation of fatty matter in

the Haversian canals leads to deformity. The urine also is generally loaded with phosphate of lime. When mollities ossium occurs during pregnancy, the deformity of the pelvis which may ensue from the bulging inwards of its sides by the pressure of the thigh bone against the acetabula, has necessitated the performance of the Cæsarean section. This disease occurs in the middle period of life, and is usually fatal in from twelve to twenty-four months.

In the *treatment* of chronic rheumatism it is always necessary to attend to the general health, as by improving this the disease will generally be materially mitigated. Care must be taken that the function of digestion is performed naturally; while sleep ought to be afforded by sedatives, if necessary. There are several special remedies which give relief, one of the best being the iodide of potassium with tincture of serpentary or with bark (F. 31). If the secretions are very acid, bicarbonate of potash should be combined with it. Cod-liver oil (F. 389) is very valuable in the great majority of cases. Quinine, with or without belladonna (F. 45, 379, 383); iodide of iron (F. 32); ammonia and bark (F. 68, 371); oil of turpentine (F. 50); colchicum (F. 46); sarsaparilla; perchloride of mercury or corrosive sublimate (F. 27); the red iodide of mercury (F. 54); arsenic (F. 52); aconite (F. 330); guaiacum and sulphur (F. 43); sulphate of soda and sulphur (F. 148); and chloride of ammonium or sal ammoniac (F. 60);—all have their advocates. The tincture of actea racemosa in half drachm doses, three or four times daily, produces slight narcotic and eliminative effects. It will often cure lumbago, as well as pains in the back due to an irritable condition of the uterus, with great rapidity (F. 320). When the symptoms are very chronic, the cold sulphurous waters of Harrogate (F. 466), or the hot sulphur springs of Aix-la-Chapelle (F. 483), may be resorted to; or sea air and warm salt water baths can be employed in this country. Sometimes the alkaline waters of Vichy (F. 479) do good; or, if there is constipation in addition to rheumatism, the antacid springs at Carlsbad (F. 496) can be advantageously visited. The latter, however, take a longer time to act on the system than the former.

Hot water, or hot air, or vapor baths (either plain, or alkaline, or medicated with sulphur) are often remarkably serviceable in this disease, especially when the pains are severe (F. 121, 125, 130). During the intervals of the attack, the tepid salt water sponge or plunge bath should be regularly employed every morning with a flesh brush, coarse towel, &c.

Local applications to the painful parts, such as blisters (F. 208), iodine paint (F. 205), belladonna and aconite liniment (F. 281), chloroform and opium liniment (F. 282), or an ointment of veratria (F. 304), often give relief. Subcutaneous injections of atropine and morphia (F. 314) are very valuable. In lumbago, a large belladonna plaster, or the emplastrum ferri or the emplastrum calefaciens, applied over the whole loins, will be productive of great comfort. The old woman's remedy of ironing the part, a piece of brown paper being placed between the hot iron and the skin, deserves mention. For rheumatism especially affecting the tendinous portions of the muscles we may recommend the external application of sulphur—either powdered or as an ointment—with bandages of new flannel; the latter being again covered with oiled silk, to increase the warmth and obviate any disagreeable smell. Some patients merely dust the inside of their stockings with sublimed sulphur, when the legs or feet are the affected parts. Where the pains are decidedly relieved by heat, acupuncture is said always to give ease, and often to effect a cure; but I have had no experience in its use. All sufferers from chronic rheumatism should wear flannel; while they must beware of exposure to damp and cold. They

ght also to be careful in their diet, and should particularly avoid beer l heating wines; as I am convinced that many paroxysms of this dise are brought on through disorders of the digestive organs. Ventnor . 434), Hastings (F. 432), Rome (F. 447), and Nice (F. 443), are good ater stations for rheumatic patients who can afford to leave their homes.

XXIII. CHRONIC OSTEO-ARTHRITIS.

Chronic Osteo-arthritis [from *Ὀστέον* = a bone + *ἄρθρον* = a joint, erminal *-itis* = inflammation] is the designation adopted by the Royal College of Physicians of London, in the "Provisional nomenclature," for he disease generally known as *rheumatoid arthritis*, or *chronic rheumatic arthritis*, or *rheumatic gout.*

It has been a matter of some controversy whether gout and rheumatism can ever be present at the same time, in the same individual. Or, to put the matter more clearly and in a simpler form,—Is there any disease which may be regarded as a compound of these two affections? Dr. Garrod has long maintained, that such a state as the term rheumatic gout implies is never seen; and this opinion is now almost undisputed. The disease to which this name has been applied will best be described as a chronic inflammatory affection of the joints, not unlike gout in a few of its characters, somewhat resembling rheumatism in other points, but differing essentially from both.

Chronic Osteo-arthritis, or rheumatoid arthritis [*Ῥεῦμα* = a humor floating in the body causing disease + *εἶδος* = appearance; and *ἄρθρον* = a joint, terminal *-itis*], is commonly one of the most troublesome and obstinate affections which the practitioner can have to treat. Young and old, rich and poor, the careless and the cautious, equally suffer from this disorder. Women are attacked more frequently than men; possibly because they are more liable to have the general health depressed by menorrhagia or some other irregularity of the uterine functions, or to get ill from causes connected with parturition. In the cases I have seen, there has been no history of hereditary predisposition. This disease attacks either the large or small joints, or the temporo-maxillary articulations, or the articular processes of the vertebræ—especially of the cervical region; but the hip, shoulder, elbow or knee, and hands, are probably the most favorite seats of the morbid action. It may also be a constitutional, or simply a local disorder. Thus Dr. Robert Adams remarks that, "when we observe it affecting all the joints in the same individual on both sides symmetrically, we may feel assured that the chronic articular affection in such a case has proceeded from some deep constitutional taint. In the majority of such cases we shall, I believe, discover that the general chronic affection has been immediately preceded by an attack of rheumatic fever, from the lingering remains of which the chronic rheumatic arthritis had evidently sprung."* On the other hand, as a local disease it may arise from accident or from the overuse of some particular joint, when it will of course be limited to this part. In the examples which have come under my own care, the affection has certainly appeared to be constitutional; and it has seemed to me that mal-assimilation has generally been at the root of it. Some of

* A Treatise on Rheumatic Gout; or, Chronic Rheumatic Arthritis of all the Joints, p. 6. London, 1857.

the most annoying cases, moreover, which I have met with, have occurred in women at the critical period of life; though I have also seen it in girls at puberty, in connection with disordered uterine functions, and in men at different ages.

The *symptoms* consist chiefly of pain, swelling, contraction, and stiffness of the affected joints. In acute cases, the disease may come on abruptly with considerable fever and general disturbance; but much more frequently the affection is of a subacute or chronic character, commencing with languor, general irritability, restlessness, loss of appetite, and vitiated secretions. The joints then become stiff and painful, while effusion into the synovial membranes causes them to appear swollen and distended; and if the hips, knees, or ankles be the parts affected, there is more or less lameness. On placing a hand at each side of the joint, fluctuation can sometimes be detected; or if we grasp the part, a distinct kind of crepitus may often be felt. A peculiar crackling of the joints on movement is also appreciable to the patient. When the disease is of long continuance a degree of rigidity may occur from the thickening of all the articular textures, equal to that produced by bony anchylosis; or the joint will even become quite disorganized from a gradual wasting of the cartilages. Then in addition to the foregoing, the articulations become more or less deformed; there are frequently painful spasms in the muscles of the affected limbs; there is great mental depression and general lassitude; dyspepsia, with acidity of the stomach and flatulence, is an exceptional occurrence; the rest at night is disturbed, and every change in the weather is felt; while owing to the languid circulation the patient suffers much from cold extremities. Neither the heart nor the pericardium ever becomes affected. The complaint always lasts for several months, and very frequently for years.

With regard to the *morbid anatomy* of rheumatoid arthritis, the following points are worthy of notice. If the disease be in an early stage, the synovial membranes are found thickened and distended with a quantity of synovial fluid; while internally the hypertrophied synovial fimbriæ can be distinguished as vascular tufts. In a more advanced state the capsular membranes are seen to be of increased density; the articular cartilages are more or less absorbed; while the exposed surfaces of the bones either present an ivory-like appearance from the friction they have undergone, or the fine cancelli are laid bare. The heads of the bones are generally enlarged in an irregular way owing to new ossific deposit. Not unfrequently the joints contain numerous small cartilaginous or bony foreign bodies, either loose, or attached by little pedicles to the articular surfaces.

If mention be made of the *pathology* of this disease, it is only to show what the affection is not. Dr. Todd believed that this rheumatic affection of the joints might be most correctly described as an abnormal nutrition, occasioned by the presence of a "peculiar matter" in the nutrient fluid; affording certain points of resemblance to simple chronic inflammation, yet differing from it in a marked manner. What this "peculiar matter" in the nutrient fluid may be, we do not know; but it is certain that it is not uric acid, and there is no reason to believe that it is lactic acid.

The *treatment* is often very unsatisfactory, and always tedious. The general health must be attended to; while in women, any uterine disturbance that may be present is to be relieved. A generous diet, with animal food, ought to be allowed. Hungarian and Greek wines, claret, good sherry, brandy and water, whisky, and dry cider or bitter ale will not usually prove injurious. Sugar, pastry, pickles, and cheese, however, had best be forbidden. Walking exercise is often impossible; but the patient should be taken out in a carriage or chair as often as the weather will per-

t. Warm clothing is necessary. Then mild aperients, especially the phate of soda and sulphur (F. 148, 153); cod-liver oil; warm douches er the affected joints; and simple water, or vapor, or hot-air baths with ntle friction, may be used in all cases. It is of the greatest importance maintain a healthy action of the skin, and sometimes particular benefit ems to arise from sulphur or akaline baths (F. 121, 125). In cases untended by acute exacerbations M. Gueneau de Mussy recommends arseni-l baths. To commence with, about fifteen grains of arseniate of soda, ith a quarter of a pound of carbonate of soda, are added to thirty gallons hot water; the bath at first being employed every second day, and afterards daily, with an occasional interval. Although slight diarrhœa, tempoary excitement, and insomnia sometimes result, yet more often there is nerely progressive improvement; the suppleness of the joints, and the power of motion increasing after each bath. From my own observation I can speak highly of these baths, when they are used as a subordinate part of the treatment. Theoretically it might be expected that they would prove valuable. For indeed arsenic is most beneficial in many of these cases, and from no other special remedy have I seen an equal amount of good result. This metal may either be given alone; or with quinine, iron, syrup of iodide of iron, iodide of potassium, bromide of potassium, liquor potassæ, taraxacum, or colchicum (F. 52, 381, &c.). Each of these drugs has also been separately lauded by different writers (F. 31, 32, 46, 379). In women all the preparations of iodine and bromine are to be avoided where there is any tendency to menorrhagia, since they will certainly increase the flow. If the gums be pale and spongy, lemon-juice does good; or the mineral acids (F. 376, 378) are occasionally to be recommended. I have seen guaiacum, given either with ammonia or sulphur or sarsaparilla, do neither good nor harm: it is a remedy from which nothing can be expected in the majority of cases. I have occasionally been pleased with bark and aconite and serpentaria (F. 374); and where the skin is inactive and the nervous system depressed, twenty minims of the tincture of arnica montana thrice daily, combined with other remedies, has seemed worth trying. Some practitioners recommend the repeated application of leeches to the affected part, but they must be used cautiously if at all. For my own part, I must distrust their utility. Blisters will possibly do good; the officinal liquor epispasticus being a convenient application where it is desired to produce vesication. I am fond of strapping the joint with the iodide of potassium or the mercurial plaster spread on chamois leather; a proceeding which may be occasionally varied by covering the part with sulphur ointment and applying a flannel bandage, or by using a lotion made of equal parts of glycerin and tincture of iodine and tincture of aconite and tincture of opium. To keep the affected articulations motionless by the application of splints, is to run the risk of causing stiff joints; an evil not counterbalanced by any great advantage.*

* The steady perseverance required to effect a cure in these cases is well illustrated by the following history: July 4th, 1859. Mrs. H., 46 years of age. Married. Has had eight children, the last being five years old. Catamenia becoming irregular; during the preceding few months, the intervals have often been six weeks. Came under my care with chronic rheumatoid arthritis on the above date. This disease has been coming on very gradually for about ten or twelve months. Without exaggeration it may be said that every joint in the body is more or less affected. Cannot walk or stand; is unable to cut her food or to do any needlework; and is conscious that she will soon be incapable of making the slightest movement, since the difficulty and pain of now doing so are very great Further particulars are unnecessary. Suffice it to say, that with the exception of two short intervals (when owing to the influence of her friends she was persuaded first to try the Bath

Other means failing, recourse must be had to the internal and external use of the Harrogate (F. 466), Buxton (F. 464), or Bath waters (F. 460), at home; or to the springs of Aix-la-Chapelle (F. 483), Wiesbaden (F. 489), Baden-Baden (F. 492), Carlsbad (F. 496), or Vichy (F. 479), abroad. After the employment of either of these saline waters, a course at Schwalbach (F. 488), or at Spa (F. 467) will probably be desirable.

XXIV. OBESITY.

The overaccumulation of fat under the integuments, and around some of the viscera, constitutes obesity [from *Obesus* = fat or gross]. By some authors it is spoken of as polysarcia [*Πολὺς* = much + *σάρξ* = flesh]. The term "corpulency" may perhaps be retained for those cases where the amount of fat is not sufficient to constitute a disease.

A moderate amount of fat is a sign of good health; and physiologists generally allow that the adipose tissue ought to form about the twentieth part of the weight of man, and the sixteenth of woman. Independently of the importance of fat, as a nonconducting substance, in impeding the too rapid escape of animal heat, it may also be regarded as a store of material to compensate for waste of tissue under sickness or other circumstances entailing temporary abstinence from food. Nevertheless, in excess this substance not only becomes burdensome and unsightly, but a real and serious evil. It is hardly necessary to give any description of obesity, since it is a condition recognizable at first sight. Yet it must be remembered that a man may be large, having the muscular system well developed, and the fat proportionately increased, without being obese. "This corpulency, or obesity," says Cullen, "is in very different degrees in different persons, and is often considerable without being considered as a disease. There is, however, a certain degree of it, which will be generally allowed to be a disease; as, for example, when it renders persons, from a difficult respiration, uneasy in themselves, and, from the inability of exercise, unfit for discharging the duties of life to others."* The *accumulation* of fat must not be confounded with the *degeneration* of muscle and other tissues into this substance.

The obese condition may be partial, or more or less complete. Of *partial* obesity we have examples in fatty tumors; and in that condition popularly

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waters, and afterwards a course of homœopathic globules), she continued under my care until May 27th, 1867; on which day she was allowed to give up all treatment, her cure being apparently permanent. From being a helpless cripple, she has by very slow degrees become able to walk freely and naturally. The remedies to which I believe she owes her recovery are—a warm water sponge bath, with friction and the use of plenty of soap, every night. Flannel under-clothing. Cod-liver oil. A diet into the composition of which milk and raw eggs largely entered. An aperient mixture, twice or thrice a week, of sulphate of soda and sulphur. A night draught containing ether, Indian hemp, and morphia. With a mixture, thrice daily, consisting of quinine, phosphoric acid, tincture of perchloride of iron, chloride of arsenic, and some bitter infusion. Of all these remedies, I attach the most importance perhaps to the arsenic. And it is worthy of observation that this drug was taken twice or thrice daily for nearly eight years with the greatest advantage. When it was displaced by the trip to Bath, and afterwards by the globules, she was so sensible that ground was being lost, that I do not think she remained out of my hands for more than eight weeks in all. When last heard of in May, 1868, Mrs. H. was continuing well.

* First Lines of the Practice of Physic, vol. iv, p. 219. Edinburgh, 1784.

spoken of as "pot-belly," from the enlargement of the omentum with fat. This structure has been known to weigh as much as thirty pounds, from excessive adipose deposit. In *complete* obesity we find the fat accumulated under the integuments (especially of the abdominal walls), between the muscles, upon the heart beneath the pericardium, in the mesentery and omentum, around the kidneys, in the mediastinum, and around the mammæ as well as about the nates of women.

Obesity is not peculiar to any particular period of life. The young, the middle-aged, and the old may suffer from it. Females, however, are more predisposed to this condition than males; and they appear more especially liable to it after the cessation of menstruation. Women, too, who have never borne children seem to be more frequently affected than such as have had several pregnancies. And I believe it will generally be found that in fat women the menstrual flow is more scanty and irregular, than it is in those whose organs are not so incumbered.

The *causes* of obesity are numerous. It is often hereditary or constitutional, the inclination being derived from either parent. This tendency is seen not only in individuals but in nations: *e. g.*, the Dutch are as stout, as the Americans are proverbially thin. Overfeeding will induce fat, and so will the habit of taking too much fluid. The obese are not always great eaters; but they invariably drink a great deal, even though it be only water. Farinaceous and vegetable foods are fattening, and saccharine matters are especially so. The instance of the slaves in Italy, who got fat during the grape and fig season, has been quoted by Galen. In sugar-growing countries the negroes and cattle employed on the plantations grow remarkably stout while the cane is being gathered and the sugar extracted. During this harvest the saccharine juices are freely consumed; but when the season is over, the superabundant adipose tissue is gradually lost. And then amongst other causes we must reckon insufficient exercise, long-continued prosperity and ease of mind, indulgence in too much sleep, and an absence of the sexual appetite. Eunuchs are generally described as being flabby and fat; whilst amongst the lower animals, fattening is readily produced after the removal of the testicles or ovaries. The way in which the same fact can be made to tell in favor of two opposing theories is curiously illustrated by two writers on this subject. Thus, Wadd cites the butchers as examples of corpulence, alleging that their excellent condition is due to animal food. He speaks particularly of the advantages of the "butcher's steak;" and does not believe that these men and their wives owe their good looks to "the effluvia of the meat."* Dancel also speaks of the frequency with which the members of the same class become obese; but he says it is because the butchers eat meat and plenty of vegetables, while their wives generally prefer vegetables to animal food. He has no faith in the opinion that their *embonpoint* has some connection with the atmosphere of nutritive animal odors in which they live.†

Fats are obtained abundantly from both the animal and vegetable kingdoms. Their predominating elements are carbon and hydrogen. They never contain nitrogen, except as an accidental ingredient. They are made up of three closely allied bodies: viz., stearin [from $\sigma\tau\acute{\epsilon}\alpha\rho$ = suet], margarin [from its lustrous appearance, $\mu\acute{\alpha}\rho\gamma\alpha\rho\omega\nu$ = a pearl], and olein [*oleum* = oil] which is fluid. When fatty matters are heated with the hydrated alkalies,

* Cursory Remarks on Corpulence; or Obesity considered as a Disease. Third Edition, p. 81. London, 1816.

† Traité Théorique et Pratique de l'Obésité, p. 84. Paris, 1863. This physician's first treatise on the subject—Préceptes fondé sur la Chimie organique pour diminuer l'Embonpoint sans altérer la Santé—was published in 1849.

they undergo saponification, during which process a viscid sweet fluid—glycerin [γλυκὺς = sweet]—is yielded. Now several physiological studies lead to the conclusion that oils and fats may not only be formed in the system from food which contains it ready prepared, but also from the chemical transformation of starch or sugar. Many experiments have been performed on geese, ducks, and pigs, which have proved that these animals accumulate much more fat than could be accounted for by that present in the food. M. Flourens had the bears at the Jardin des Plantes fed exclusively on bread, and they became excessively fat. Magendie, in making experiments on the forage of horses, found that these animals constantly returned more fat in their excrements than their food contained. And several authors have shown that bees form wax, which strictly belongs to the group of fats, when fed exclusively on purified sugar. If with foods of this nature the animals be subjected to a warm atmosphere and allowed but little room for movement, the adipose tissue rapidly gets increased. At Strasburg, the place of all others most noted for its pâtés de foie gras, the geese are fatted by shutting them up in coops within a room heated to a very high temperature, and stuffing them constantly with food. Here all the conditions for insuring obesity are resorted to—viz., external heat, obscurity, inactivity, and the cramming of the animals with nourishment. A still greater refinement for pandering to the appetite is resorted to by the Italians, who appear particularly to relish the fat of the ortolan. To procure this in perfection, the natural habits of the bird were watched; and it having been proved that food is only taken at the rising of the sun, cunning men have arranged that this luminary shall rise much more frequently than nature has ordained. To effect this, the ortolans are placed in a dark, and warm chamber, which has but one aperture in the wall. Food being scattered over the floor, a lantern is placed at a certain hour in the opening; and the birds misled by the dim light, believing that the sun is about to shed its rays upon them, at once consume their rations. The meal finished, the lantern withdrawn, and more nutriment scattered about, the ortolans fall asleep, as in duty bound; though probably not without a feeling of surprise at the shortness of their day. Two or three hours having elapsed, and digestion being completed, the lantern is again made to throw its light into the apartment. The rising sun recalls the birds to the necessity of again feeding; and of again sleeping as they become enveloped in darkness. Thus this process is repeated several times in the twenty-four hours: until, at the end of two or three days, the ortolan becomes a delicious little ball of fat, ready to minister to the palate of the gourmand.

The *consequences* of obesity are often more serious than is generally believed. To put aside many minor inconveniences (which, however, may be sufficiently annoying to make the sufferer desirous of reducing his weight, even at a little risk to his health) it may be taken as a general rule that obesity does not conduce to strength or to longevity. The functions of various important organs being constantly impeded must cause many distressing disorders. Falstaff, whose "pelly was all putter," as the Welsh parson said, suffered more from his ridiculous figure than from any real evil. The chief fear of this "huge hill of flesh" seems to have been that they might "melt him out of his fat drop by drop, and liquor fishermen's boots" with him. Daniel Lambert, at one time, weighed 52 st. 12 lbs., or 740 lbs., and he died suddenly in 1809, in his fortieth year. Bright, a grocer, at Maldon in Essex, who had attained to 616 lbs. at his death, and the capacity of whose waistcoat was said to be such that it could inclose seven ordinary persons, only lived to be twenty-nine. Palmer, the landlord of the Golden Lion at Brompton, in Kent, weighed 25 st. It is said

at coming to London to see Lambert, he was so affected at the greater grossness of his more corpulent rival, that the irrepressible envy caused his death. Whatever the truth may be, he certainly died three weeks after his visit to the metropolis. John Love (an apprentice of Ryland, the celebrated engraver who was executed for forgery) became so emaciated through grief at his master's fate, that his friends thought he was becoming consumptive. A physician recommended an abundance of nutritious food, under the influence of which he soon became as heavy and corpulent as he had previously been slender. He died, "suffocated by fat," in his fortieth year, his weight being 26 st. or 364 lbs. Dr. F. Dancel, in his excellent work (p. 26) already referred to, quotes from the *Javannach News* for 1853, the following: There lived, eighteen miles from Batavia, a young man who weighed 565 lbs. (40 st. 5 lbs.) when he was twenty-two years of age. His size continued to increase until a little over 600 lbs. (42 st. 12 lbs.) He was comfortable and took care of a plantation. At the end of four weeks he began to increase again in weight, at first to the extent of 1½ lbs. daily, and then of 2 lbs. In the last week he died suddenly in his chair, suffocated by fat. Three days before his death he weighed 643 lbs. (45 st. 13 lbs.).

As a rule, to which every one can call to mind exceptions, excessive corpulence diminishes both bodily and mental activity. One of the most anomalous cases is mentioned by Maccary, who states that he met at Pavia the most enormously fat man he ever saw, but who nevertheless was a dancer, and was exceedingly agile and graceful in his movements. Yet generally obesity is accompanied with diminished vital power; there are disturbances of the organs of respiration, circulation, and digestion; the blood is proportionately deficient in quantity or quality; the muscles are weak and have but little firmness; while the countenance is bloated and sallow. And although the disposition is often sanguine, so that the sufferer continues lively and cheerful, and has the happy habit of looking at the best side of everything, yet active mental occupation is generally as uncongenial as repose and idleness are in harmony with the inclinations. Lord Chesterfield is no great authority, but he mixed much with men, and in his opinion fat and stupidity were such inseparable companions, that he was accustomed to say they might be used as convertible terms.*

The *treatment* of obesity would now seem to rest upon a more sure basis than it has hitherto done, the investigations pursued by Dr. Dancel having been mainly instrumental in leading to this result. As a proof of the truth of this remark we may look back for a moment to the curative agents formerly in use. Thus, we find a tolerable list of remedies in the pages of Maccary,† which includes bleeding from the arm or jugular vein; leeches to the anus; dry cupping; prolonged blistering; vegetable diet with vinegar; acids, except nitric and phosphoric; hot baths; salt-water baths; baths of Aix, Spa, Forges, Rouen, and Acqui; occasional starvation; decoction of guaiacum and sassafras; scarifications; salivation; the induction of grief and anxiety; purgatives; issues; pricking the flesh with needles;

* Lord Byron undervalued David Hume, denying his claim to genius on account of his bulk, and calling him, from the Heroic Epistle—"The fattest hog in Epicurus' sty." Another of this extraordinary man's allegations was, that "fat is an oily dropsy." To stave off its visitation, he frequently chewed tobacco in lieu of dinner, alleging that it absorbed the gastric juice of the stomach, and prevented hunger. Rejected Addresses. By James and Horace Smith. Twenty-fourth Edition. Note to p. 13 London, 1855. Somewhat in the same strain Mirabeau said, alluding to a very corpulent man, that he only had been created to show to what an extent the human skin could be stretched without bursting.

† Traité sur la Polysarcie. Paris, 1811.

walking with naked feet; and removal of exuberant fatty tissue with the scalpel. Since this ridiculous catalogue was published, Turkish baths, sea voyages, very little sleep, emetics, digitalis, soap (a relative of Mr. Wadd's ordered a quarter of a hundredweight of Castile soap for his own private eating), salt, mercury to salivation, the inhalation of oxygen gas, anti-corpulent belts worn round the stomach day and night, quinine, purgatives, diuretics, the extract of the fucus vesiculosus, and preparations of bromine or of iodine, have been freely tried. Dr. Thomas King Chambers, believing that the chemical affinity of alkalies for fat points them out as appropriate alteratives in this complaint, has recommended liquor potassæ, in half drachm or drachm doses, thrice daily. The medicine is taken in milk and water, since milk covers the taste better than anything else, while the efficacy of the potash is not endangered because a part of it is saponified. Dr. Chambers of course regulates the diet, interdicting fat, oil, and butter; while he recommends very light meals off substances that can be quickly digested. The patient is also to devote many hours daily to walking or riding. Moreover, he may employ cold salt-water baths, or vapor baths, with friction to the skin.* But all these plans, however perseveringly carried out, fail to accomplish the object desired; and the same must be said of simple sobriety in eating and drinking.† For it must be remembered that as physicians we are called upon not only to prevent the increase of fat, but to diminish the redundant quantity which has already been formed, without lessening the normal vigor of the system. The question is, can this be done?

Now I believe that obesity may safely be diminished, and that we are indebted for our power to do so to the light which has been shed by physiological chemistry on the production of fat in the body, and our knowledge of the influence of respiration in removing carbon from the blood. The researches of Dr. Dancel have also served to reduce all this to a system, as well as to direct attention to it. But it is only fair to allow, while giving every credit to this physician, that something is due to Mr. Banting for bringing the subject before the public in a plain and sensible manner.‡ In

* Corpulence; or, Excess of Fat in the Human Body. London, 1850.

† The inutility of a diet restricted to slops is well shown in the following case, related by Wardell. The subject of the history was a female patient at the Edinburgh Royal Infirmary. She was forty years of age, of short stature, and so obese as from the first to make her case an alarming one. The features were grown up with fat, so that the eyes looked small and sunken. Even walking up and down the ward was attended with difficulty, the exertion giving rise to great embarrassment of breathing. "The appetite was preternaturally large; somnolency so persistent that whenever left but a few mintes to herself, she dozed over into slumber. There was a torpor of mind, an aversion to all exercise, a listless apathetic state, which so characterize this curious disease. She was ordered a diet not more nourishing than allowed to the fever patients, consisting chiefly of panado and slops, yet the polsyarcia progressed, and after being some time an inmate in the hospital, she died with comatose symptoms." Remarks on Obesity, p. 11. London, 1849. Reprinted from the London Medical Gazette.

Wadd has also told us that "among the Asiatics, there is a sect of Brahmins who pride themselves on their extreme corpulency. Their diet consists of farinaceous vegetables, milk, sugar, sweetmeats, and ghee. They look upon corpulence as proof of opulence; and many arrive at a great degree of obesity, without tasting anything that has ever lived." Opus jam citat., p. 80.

Dr. Fothergill stated that a strict vegetable diet produces exuberant fat more certainly than other means. And Mr. Moore mentions the case of an enormously fat woman who exhibited herself at some house in the Strand, in 1851. Upon questioning her and the exhibitor, he found that they were both rigid vegetarians, and were not a little proud of belonging to this sect. Corpulency, *i. e.*, Fat, or Embonpoint, in Excess. Fourth Edition, p. 14. London, 1860.

‡ Letter on Corpulence, addressed to the Public. Third Edition. London, 1864.

the month of August, 1862, this gentleman was 66 years of age, 5 ft. 5 in. in stature, and 14 st. 3 lbs. (202 lbs.) in weight. He could not stoop to tie his shoe, was unable to attend to the little offices humanity requires, was compelled to go down stairs slowly backwards to avoid the jar of increased weight on the knee and ankle-joints, and was made to puff and blow with every slight exertion. After trying many remedies (including fifty Turkish baths, with gallons of physic) without the slightest benefit, he consulted Mr. William Harvey for deafness. Mr. Harvey, believing that obesity was the source of the mischief, cut off the supply of bread, butter, milk, sugar, beer, soup, potatoes, and beans. In their place he ordered the following diet, which I venture to briefly criticize in the hope of improving the lesson:

Breakfast. Four or five ounces of beef, mutton, kidneys, broiled fish, bacon, or cold meat (except pork); a large cup of tea without milk or sugar, a little biscuit or one ounce of dry toast. [Brown bread, or crust off the common household loaf, might have been allowed.]

Dinner. Five or six ounces of any fish except salmon [it would have been as well also to have forbidden herrings and eels], any meat except pork, any vegetable except potato, one ounce of dry toast, fruit out of a pudding, any kind of poultry or game, and two or three glasses of good claret, sherry, or Madeira. Champagne, port, and beer forbidden.

Tea. Two or three ounces of fruit, a rusk or two, and a cup of tea without milk or sugar. [Coffee might have been permitted.]

Supper. Three or four ounces of meat or fish, and a glass or two of claret.

For *nightcap*, if required, a tumblerful of grog (gin, whisky, or brandy, without sugar) or a glass or two of claret or sherry. [Like other nightcaps, this was certainly unnecessary.]

At the same time a draught containing a drachm of the aromatic spirits of ammonia, with ten grains of carbonate of magnesia, was given once or twice daily, on an empty stomach. The result of this treatment was a gradual reduction of 46 lbs. in weight, with better health at the end of several weeks than had been enjoyed for the previous twenty years.

The explanation of all this is very simple. Food, as has been already mentioned, consists of azotized or nitrogenous, and non-nitrogenous principles. The *former* (the nutritive or plastic class) includes all fibrous and albuminous matters, such as animal food; these matters aiding the formation of blood and muscle, but not entering into the composition of adipose tissue. The *latter* (the calorifacient or respiratory class) consists of oily and fatty materials, with sugar, gum, starch, and vegetable acids, all of which contain carbon and hydrogen, the elements of fat. Man undoubtedly requires a mixed diet; that is to say, nitrogenous food is needed for the formation or renewal of the tissues and other nitrogenous parts of the body, while the respiratory food is required for the production of the fatty components of the body, and as affording materials for respiration and the production of heat. Hence it is clear, that while we may limit the non-azotized substances, they must not be altogether cut off. Moreover, it is of practical importance to remember that the elements which are chemically convertible into fat are rendered more fattening if alcoholic liquids be added to them in the stomach; probably because of the power which stimulants possess of lessening or delaying the destructive metamorphosis. It may be said that a diet such as Mr. Harvey recommended is calculated to induce the uric acid diathesis with gout. The only answer is, that this occurrence seems provided against by the draught of ammonia and magnesia. Moreover, as a matter of experience, this gentleman tells me he has not found any indication of gout to follow his treatment; and, in cases which I have successfully treated according to his rules, not the slightest symptom of the

kind has occurred. But even should an attack of gout result, it is really a disease of minor importance compared to obesity, except as a confirmed affection.

Two points only remain for consideration. One is that every patient under treatment for this morbid state should be regularly weighed, while the condition of his health is to be carefully watched. Particularly, heed is to be taken that the appetite does not fail, the power of digestion fall off, constipation take place, the action of the heart become enfeebled, or the blood get impoverished. As a rule, the diminution in gravity should not be allowed to progress more rapidly than at the rate of one pound a week; and it ought not to be carried to too great an extent. In a previous section (p. 138), as well as subsequently in the remarks on Phthisis, the reader will find tables of the normal weight in proportion to the age and stature; which tables may form rough guides for the practitioner, serving to show him the extent to which redundant fat may be safely reduced.

And lastly, on the part of both physician and patient, firmness of purpose and steady perseverance will be needed. The former, however, must be careful not to hold the reins with too tight a hand. Frequently, he will have to pour balm upon the irritable feelings of the man who, on this as on a few other occasions, may think he is paying too dearly for the relief of his disease. We cannot affect to feel any surprise at the querulousness of Charles Lamb, when he asks in one of his letters to Wordsworth, "What have I gained by health? Intolerable dulness. What by early hours and moderate meals? A total blank." Shall we therefore be surprised when those who consult us are not altogether as tractable as could be wished? And when a sociable citizen finds, that to lose some pounds of superfluous fat he is obliged forcibly to mortify his tastes, as well as to alter the mode of living to which he has for years habituated himself, is it to be wondered at that such a one should often politely thank us for our advice, but still prefer to let his palate and stomach deal with him as they think fit.

PART II.

FEVERS.

FEVER [from *Ferveo* = to burn], or Pyrexia [*Πῦρ* = fire + *ἔχω* = to hold], is to be defined as a grave morbid condition caused by the action of a poison on the blood, and through this on every tissue of the body. Consequent upon this action there is a preliminary stage of languor and weakness, defective appetite and nausea, frontal headache and pains about the loins and limbs, with some degree of chilliness or shivering; this being succeeded by the confirmed stage, in which we find preternatural heat of body, increased waste of tissue, acceleration of pulse with derangements of the capillary circulation, great muscular debility, and disturbance of most of the functions. Owing to the derangements of innervation and circulation and secretion which are set up, an accumulation of effete products takes place in the blood. The concluding phenomena are those of crisis and elimination.

Much has been written on the classification of the *idiopathic* or *essential* fevers (so-called to distinguish them from *symptomatic* fever, or that abnormal state which accompanies many different diseases as one of their phenomena), each author having some favorite arrangement which does not always simplify the subject. In order to be as clear as possible, I shall consider the different varieties of fever according to the following plan:

I. Continued Fevers.
   1. *Simple Continued Fever.*
   2. *Typhus Fever.*
   3. *Enteric*, or *Typhoid Fever.*
   4. *Cerebro-Spinal Fever.*
   5. *Relapsing*, or *Famine Fever.*

II. Intermittent Fever, or Ague.

III. Remittent Fever.

IV. Yellow Fever.

V. Eruptive Fevers.
   1. *Small-pox*, or *Variola.*
   2. *Cow-pox*, or *Vaccinia.*
   3. *Chicken-pox*, or *Varicella.*
   4. *Measles*, or *Morbilli.*
   5. *Scarlet Fever*, or *Scarlatina.*
   6. *Dengue.*
   7. *Erysipelas.*
   8. *Plague*, or *Pestis.*

Two of the Continued Fevers resemble the Eruptive in being infectious or contagious—these terms being regarded as synonymous, in having a peculiar eruption on the skin, and in the fact that one attack generally

confers immunity from any subsequent assault of the same disease. Thus typhus affords protection from typhus for the future, but not from enteric fever; just as the susceptibility to small-pox is exhausted by an attack of this disease, though the system may still be affected by measles, or scarlet fever, &c. Each type of fever has its own special cause. At least three varieties of continued fever have their origin in known and preventible causes; in this respect resembling intermittent fever, and differing from the so-called eruptive fevers. And then, fevers run a regular definite course, and have a certain duration: each may be said to have a self-limited career.

I. CONTINUED FEVERS.

Continued Fever is so termed from the fact that it pursues its course without any well-marked remissions.

The cause of fever is the contamination of the blood by some morbific agent. When this change (the nature of which is unknown) has proceeded to a certain extent, the researches of Dr. Parkes teaches us that the nervous system, or rather that part especially connected with nutrition and organic contractility, begins to suffer alterations in composition. The muscles, and probably some of the organs, deprived more or less of nervous influence, begin to disintegrate, this disintegration producing undue heat; the condition of the vagus and vaso-motor nerves induces increased action of the heart and dilatation of the vessels; the contaminated blood is still further deteriorated by receiving the rapidly-disintegrating tissues, by the continued action of the morbid agent, as well as by the functions of the lungs, and liver, and spleen, &c., being impeded; while, since no food is taken, the various alkaline and neutral salts are no longer received into the system.

There are five varieties of Continued Fevers: 1. *Simple continued fever*, including *febricula*, which is non-contagious, and arises from overfatigue, errors in diet, and exposure to the sun's rays. 2. *Typhus*, which is infectious, occurs among the poor, and is due to some poison generated by famine and destitution, as well as by overcrowding in prisons and workhouses, or even ill-ventilated rooms. 3. *Enteric, typhoid*, or *pythogenic fever*, met with equally amongst rich and poor, generated by the putrid emanations from decaying animal matter, most prevalent in autumn, and which is infectious, though less so than typhus. 4. *Cerebro-spinal fever*, a malignant epidemic disease attended with lesions of the membranes and surfaces of the great nervous centres; and which, of late years, has mostly occurred where numbers of persons have been congregated together. And 5. *Relapsing*, or *famine fever*, which is very contagious, and is probably produced by famine alone.

To show the relative prevalence of the four principal forms, it may be mentioned, that during the ten years ending with December, 1857, there were admitted into the London Fever Hospital 6628 cases of fever; of which 861 were Febricula, 3506 Typhus, 1820 Enteric, and 441 Relapsing fever. With the exception of the years 1850 and 1851 there was a preponderance of typhus; but in one of these two years, the typhoid cases, and in the other the relapsing, were in excess. There seems to be a comparative immunity from typhus during certain years in London; as may be shown by the returns for 1858 and 1859, in which years there were admitted into

the hospital only 63 examples of typhus against 356 of typhoid fever. Now again, the typhus cases are largely in excess. Taking the three years 1864, 65, 66, the numbers with typhus have been 2497, 1961, and 1735; while the examples of enteric fever were 252, 520, and 575. Moreover, in neither of these years was there a single instance of relapsing fever; although in 1851 there were more cases of this kind than of any other.

According to the Reports of the Registrar-General, the deaths from all forms of continued fever, in England, during the ten years from 1857 to 1866, both inclusive, were 182,210. Hitherto, the different species have not been distinguished in the Returns.

1. **SIMPLE CONTINUED FEVER.**—This variety of fever, where it runs an uncomplicated course, is always a mild disease; having a variable duration of from one to ten days. When lasting only for a day or two it is spoken of as *ephemeral* [from Ἐπὶ = through + ἡμέρα = a day] fever. *Febricula* [dim. of *Febris* = a fever] is an appropriate name as denoting its comparatively trifling character.

Simple fever commences for the most part without any warning; the patient being suddenly seized with lassitude, disinclination for bodily or mental exertion, loss of appetite, sickness, frontal headache, dull aching of back and limbs, coldness of the surface—especially of the back, and often shivering. At the end of a few hours, in most cases, the chilliness passes off, and the skin becomes dry and hot. There is no characteristic eruption: a crop of herpes perhaps appears on the lips. The pulse is then found frequent, large, and hard—perhaps 120 or 130 in a minute. There is increased headache and restlessness; a dry and furred tongue, with urgent thirst, as well as constipation. The urine is scanty and high-colored. Moreover, the patient usually complains of pains in his limbs, or of a feeling of soreness over his body; he rapidly emaciates; his countenance becomes pale and haggard; he wanders in his talk, or even has slight delirium; and he seems very seriously ill to his friends. An exacerbation or aggravation of all the symptoms frequently occurs towards night; with a slight remission at the approach of morning, when sleep is often obtained. These symptoms usually continue for three or four days, although exceptionally they are prolonged for two or even three weeks. But in the common run of cases, it happens on the fourth day, sometimes on the fifth or sixth, that the tongue becomes moist; the skin gets less harsh and dry; the headache and pains in the limbs abate; and then a profuse sweating follows. This sweat proves the natural crisis or termination of the disease. It leaves the patient languid and exhausted; but with a pulse of the natural standard, and a complete freedom from the fever. Where perspiration does not occur, a critical hemorrhage from the nose, or rectum, or uterus, may set in; or there will perhaps be an attack of diarrhœa; or an eruption of herpes breaks out on the face; or there may be an increased action of the kidneys, the urine becoming loaded with urates. Convalescence gradually and steadily takes place, some weeks perhaps elapsing before the patient thoroughly regains his flesh and strength.

Simple fever is very seldom attended with any danger; and inasmuch as it is not due to any specific poison, is non-infectious. Nosologists have divided it into different classes, according as one particular organ has been more affected than another; so that in some books we find unnecessary distinctions into brain, catarrhal, gastric, mesenteric, and bilious fevers. Dr. Murchison says, that from his own observations in India and Burmah, he is convinced "that the Common Continued Fever, the Ardent Fever, and the Sun Fever of the tropics, are nothing more than severe forms of

the Simple Fever or Febricula of Britain."* The disease, as seen in India, occurs chiefly among recruits newly arrived, rather than in disciplined soldiers. It usually comes on directly after exposure to the sun's rays, in the hot dry season (March, April, and May), when the thermometer ranges from 92° to 114° Fahr. The prominent symptoms enumerated by Dr. Murchison are chilliness, perhaps with nausea and vomiting. A pulse of 100 to 120; a burning skin, flushed face, and intense headache; great thirst; restlessness and sleeplessness; and scanty dark urine, of low sp. gr., containing crystals of uric acid. About the fifth day there is often delirium; followed by unconsciousness, contracted pupils, and perhaps coma. Death may happen from coma or collapse. With favorable cases, between the sixth and ninth days, there is a free perspiration, a fall in the pulse, increased secretion of urine loaded with urates, and convalescence.

All fevers seem disposed to run a certain course, and to terminate naturally in the re-establishment of health when uninterfered with by art. But as in the treatment of other disease, there are certain general objects, called the *indications of cure*, which must be kept in view. In fever these indications are: (1.) To moderate, where necessary, the violence of arterial excitement by saline laxatives, rest in bed, and low diet. (2.) To support the powers of the system as soon as they begin to flag. (3.) To obviate local inflammations and congestions. And (4.) to relieve any urgent symptoms as they arise. It was well observed by Pitcairn—"I do not like fever-cures. You may *guide* a fever; you cannot *cure* it. What would you think of a pilot who attempted to quell a storm? Either position is equally absurd. In the storm, you steer the ship as well as you can; and in a fever, you can only employ patience and judicious measures to meet the difficulties of the case." What these *judicious measures* really consist of the reader will be able to deduce from the remarks on the treatment of typhus.

For the ardent fever of India and other tropical countries, emetics, purgatives, diaphoretics, low diet, and tepid sponging are employed. With some plethoric subjects, venesection, leeches to the temples, cold applications to the head, cold affusion, as well as the administration of tartar emetic, have been required. When the urgent symptoms are removed, quinine should be given.

2. TYPHUS FEVER.—The prominent symptoms of typhus are an increase in the temperature of the body, an unduly abundant excretion of urea and carbonic acid by the kidneys and lungs, the eruption of a mulberry rash, and a state of utter helplessness and prostration. This form of fever† is eminently infectious; it often prevails epidemically, during seasons of general scarcity, attacking individuals of both sexes and all ages; and it is the accompaniment of destitution, being generated in overcrowded and ill-ventillated dwellings. Its duration is from fourteen to twenty-one days.

Causes.—A predisposition to typhus may be engendered by all depressing bodily and mental influences. Intemperance, bad or insufficient food, overfatigue, fear and mental anxiety, diarrhœa and lowering diseases generally, prevent the system from resisting the contagion. Overcrowding of

* A Treatise on the Continued Fevers of Great Britain, p. 598. London, 1862.

† Prior to 1759 the disease was known as Putrid, Pestilential, Malignant, Jail, Ship, Camp, or Hospital Fever. Sauvages then described it under the name of Typhus. This word is derived from Τύφος = stroke; an expression employed by Hippocrates to denote a lethargic disease, in which the patient is suddenly deprived of his senses, as if thunderstruck. In the present day, typhus is often popularly spoken of as *Brain fever*.

elling-houses—that general unhealthy condition engendered by the accu-lation of a number of individuals in unventilated houses or rooms, hnically known as *ochlesis*, is a most important cause. Where houses : so huddled together that free currents of air cannot pass through them, d where the ill-fed inhabitants fail to pay any attention to domestic or rsonal cleanliness, there typhus will revel. Whether intense crowd-poi-ning may be alone sufficient to generate the toxic material of typhus is ubted by some authorities; although a mass of evidence in favor of this ew has been adduced.

Symptoms.—After the reception of the fever-poison there is commonly a eriod of *incubation*, during which the patient perhaps complains of slight ailliness, nausea, pain in the back, loss of appetite, thirst, languor, and eadache. The duration of this precursory stage varies; but it is usually hort—from one or two to twelve days, and it ends suddenly in an attack f shivering, quickly followed by the symptoms which are common to many cute affections. These are chiefly increased headache, dryness with heat of skin, thirst, a heavy dull look, constipation, frequent soft pulse, dry tongue, stupor, prostration, and muscular pains; while towards the even-ing of each day there is aggravated irritability and restlessness, causing a wakeful night. The evening temperature as taken by the thermometer in the axilla, is often rather lower than that of the morning: the mercury will perhaps reach 105° by 8 A.M., on the third day. The mulberry typhus rash (sometimes called a *morbilliform* eruption, from its resemblance to the efflorescence of measles) appears between the fourth and seventh days from the commencement of the disorder. It consists of irregular spots, of a dusky or mulberry hue, disappearing on pressure, and feeling as if slightly raised above the skin. These spots may be few and single, or numerous and large owing to the coalescence of several, or they may be pale and produce merely a mottled appearance; while their number and depth of color will be found to be in proportion to the severity of the attack. They are most commonly first seen on the abdomen, and then on the chest and extremities; in a day or two they become of a brickdust color, and only slightly fade on pressure; while each patch of eruption remains permanent till the end of the fever. This eruption is often accompanied by, or becomes converted into, petechiæ. It is very rarely indeed absent in adults; but in children, particularly in mild cases, it will perhaps be present in only three cases out of four.

During the first week the patient generally complains much of headache and noises in the ears; while subsequently there may be deafness. The conjunctivæ are found injected: when delirium sets in the pupils are often contracted, and insensible to light. The sense of taste is impaired, as is also that of smell; there is loss of appetite, but no symptom of intestinal irritation, no flatulence, no diarrhœa; while the tongue, which at first is pale and soft, and tremulous and notched by the teeth, becomes brown and dry, and in grave cases almost black and covered with offensive bloody sordes. In most instances there is more or less wakefulness, particularly at night. Perhaps the sufferer sleeps, however, though when he awakes he declares he has not closed his eyes. Now and then, especially about the ninth or tenth day, there is profound somnolence, which may end in fatal coma. Or there may be that condition described as coma-vigil by Sir William Jenner; in which the patient lies with his eyes wide open, evidently awake, but indifferent or insensible to all going on around him. This state may last from one to four days, when it is almost invariably terminated by death.

The urine is often diminished in quantity, and is of high specific gravity;

while it contains an increased amount of urea and uric acid and pigments. The chlorides are much diminished. Now and then there is albuminuria: and occasionally a complete suppression, with convulsions and fatal uræmia. Care must always be taken not to mistake retention for suppression. If no urine be passed, or if it be found constantly leaking away, a catheter should be at once introduced. A constant dribbling of urine is the most certain symptom of an overloaded bladder. The weakness which affects the muscular system, almost from the first, is very remarkable; the prostration gradually increasing, until those who have been strong and robust become so powerless that they cannot turn in bed or raise a limb. The countenance is of a dusky tint, the gaze dull and vacant, while the features get wasted and pinched to an extreme degree. The breath may have an ammoniacal odor. Muscular twitchings of the face and hands are not uncommon; or there may be some irritation of the diaphragm causing troublesome hiccup.

Delirium is seldom present before the end of the first week, and the way in which it then comes on is worthy of notice. The patient from being perfectly rational passes through every grade of delirium, perhaps in the course of two or three hours, to the most wild and furious perversion of mind. At first there is merely "wandering," and the sufferer is conscious every two or three minutes that he is talking nonsense. Then there is confusion of ideas with vague rambling talk, from which he can be roused. This is followed by illusions, especially of the senses of hearing and vision; while soon every function of the mind becomes disordered by unreal images and aberrant trains of thought, which cannot be corrected by any external impressions. These ravings, however, are usually remembered, and the sufferer is able to explain the reasons for his shrieks and violence. He recollects, for instance, that he was confined in some dungeon, or was pursued by enemies bent on murdering him. He visited distant countries to seek concealment, but in vain. His foes were at hand; he would not yield, however, without a struggle. And then he raved, sprang from the bed, and attempted to reach the door or window to fly from his tormentors. In a case of erysipelas with great prostration, which I well remember nursing through a long night, the delirium was of the same character as occurs in typhus. The patient every few minutes became furious, shouting out "Police," "The villains are coming," "Help," &c., at the same time attempting to jump out of bed. It afterwards appeared that he was being made an example of for his sins; that strong men took and forced him into a brass box the size of an orange; and that then he was carried to a height and hurled down. As he escaped from the broken cage he became somewhat calmer, asked for drink, and said it was dreadful torture; until suddenly starting again, with a wild look, he would cry out at the top of his voice, "There, look,—they are coming. Police," and so on. Sometimes this delirium ends in coma; but in favorable cases it gradually passes off in two or three days, the patient enjoys a long quiet sleep, and then begins to recover his memory as well as the other mental powers.

With regard to the condition of the heart, Dr. Stokes points out that it is liable, in common with other organs, to suffer from organic and functional alteration; in one set of cases there being excitement of the heart, while in another class we may find depression, but neither of these results being due to inflammation. A progressive loss of impulse as well as of the systolic sound, a slow pulse, sighing respiration and a tendency to syncope, are the principal indications of the depressed state of the heart: this depression being generally due to a softened state of the walls of the ventricles, especially on the left side, though undoubtedly the heart may be found simply weakened without softening. Conversely, a strong and

jerking impulse, with distinctness of both sounds, indicates the excited condition, in which, however, the pulse will be found feeble and the extremities cold, while occasionally there is loss or diminution of the second sound. The production of a murmur, in connection either with the excited or depressed state of the heart, is of rare occurrence.

The observations which have been made with the sphygmograph by Marey, Wolff, Anstie, Sanderson, Foster, and others, have proved that remarkable changes occur in the pulse during the course of febrile diseases. The pulse-curve in health has a tricotous form;* but in fever this curve has a tendency to become dicrotous or even monocrotous. According to Wolff,† these changes are chiefly effected by the deepening of the aortic notch. When this notch has not sunk to the level of the curve-basis, and has not quite swallowed up the first secondary wave, though it has annihilated the second and slightly retarded the dicrotism, the pulse is said to be hypodicrotous. With this, the temperature of the body seldom exceeds 100° Fahr. When the notch sinks to the level of the curve-basis, the first secondary wave having almost disappeared while the dicrotism is still more retarded, the pulse is called dicrotous. The rate of the pulse is then about 100, and the temperature 103°. If the aortic notch sinks below the level of the curve-basis and the dicrotism appears partly blended with the line of ascent of the next pulsation, the pulse is called hyperdicrotous. The temperature is generally above 104°. Where this hyperdicrotous pulse changes into the monocrotous form at an advanced stage of fever, death is almost sure to follow. Another grave sign is irregularity in the pulse-curve; while an undulatory irregularity is of still more serious import, since it shows that the force of the ventricle is momentarily changing. Although the arterial tension is low in fever, yet with a heart acting well the pulse-trace will show a vertical line of ascent with a sharp summit; but when the heart's action fails, then the ascension line is short and non-vertical with a square summit. Finally, it has been shown by Anstie that the administration of alcohol in the low stage of fevers, and other acute diseases, when a stimulant is really required, increases the arterial tension—it shallows the depth of the dicrotic notch, and lessens the frequency of the pulse. On the other hand, where the alcohol acts injuriously as a narcotic, it lowers the arterial pressure—increases the dicrotism and quickens the pulse-rate. Moreover, while the summits of the pulse-trace are pointed and the curves of good height, there is not much cause for anxiety; but directly the apices are softly rounded and the curves small, with the fever still high, prompt and liberal stimulation is needed to assist the failing heart.

The lungs are apt to become secondarily affected, and the danger of the fever will thus be increased by the occurrence of acute bronchitis, or pleurisy, or pneumonia. The latter may run on to pulmonary gangrene, which is almost always fatal. Congestion and œdema of the lungs are not uncommon. In a few instances there has also been inflammation of the larynx and pharynx, and in a still smaller number of cases, inflammation of the brain or its membranes. Amongst other occasional complications must be mentioned diarrhœa, obstinate sickness, swellings and suppurations of the parotid or submaxillary glands, erysipelas, pyæmia, convulsions, and gangrene of the toes or feet.

The approach of convalescence is, in the majority of cases, somewhat

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* See the remarks on the Sphygmograph in the description of the Valvular Diseases of the Heart, Part V, Section 27.

† Quoted from an excellent review of recent works on the Sphygmograph in the British and Foreign Medico-Chirurgical Review, No. 83, p 15. London, July, 1868.

visiting clergy, medical men, and students); whereas *typhoid fever* is anything more common among the rich than the poor. Again, *typhus* m occur at any age, while *typhoid fever* rarely attacks persons after forty, a is most common in youth; the former is slightly less dangerous than t latter; and then relapses do not occur in *typhus*, while they occasional happen in *typhoid*. (5.) Both diseases are contagious, but each propagat itself, and not the other: an attack of the one does not act as a preventi to infection by the other at any future period. (6.) In *typhus*, the dur tion of the symptoms is from fourteen to twenty-one days; whereas *typhoid* it is seldom less than from twenty-two to thirty days. Moreove in the former the danger increases until the end of the second week, wh the disease reaches its maximum; whereas in the latter the maximum not attained for at least a week longer. In either case it occasionall happens that the patient falls a victim to the disease at the very onse knocked down and killed at once, as it were, by the virulence of the poiso Speaking generally, Dr. Murchison shows that the rate of mortality fro continued fever, during a series of years, has differed but little in th various hospitals of England and Scotland, being about one in eight. Th fatal cases in typhus and typhoid are one in between five and six; where in relapsing fever they only average about one in forty.*

There have been some very few cases in which both typhus and typhoi fever have existed together in the same individual; a circumstance that no more remarkable than the coexistence of typhus and erysipelas, or measles and small-pox.

Morbid Anatomy.—A case of typhus may run its course and end fatall without leaving any traces of its existence. In the majority of instance there is nothing more than slight congestion of the mucous surfaces different organs.

When the case has been complicated with secondary affections, we o course look to the structures which have suffered. The brain is seldo altered; but there may be engorgement of the sinuses, or congestion of th cerebral substance. The pia mater is occasionally loaded with blood, an sometimes there has been found slight hemorrhage into the cavity of th arachnoid. The effects of inflammation will, perhaps, be discovered in som part of the respiratory apparatus; while occasionally the muscular sub stance of the heart is found soft, so that it is easily torn. The conditio of the alimentary canal is normal; the liver is healthy; while in abou half the cases the spleen is softened, and in a smaller proportion is likewis enlarged.

The blood contains a deficient amount of fibrin; and according to mos

* It is very difficult to draw correct conclusions as to the value of any particula form of treatment from a comparison of the mortality at various hospitals. Even i the same institution the physician or surgeon of greatest repute may have a large proportion of fatal cases than his less celebrated colleague. The beds of the latte are filled with ordinary cases from the out-patient room: those of the former receiv confirmed invalids from all parts of the country,—often sufferers coming as a forlor hope, having been deemed incurable by others. With regard to fever, Dr. Mur chison shows that the percentage of deaths at King's College Hospital between 184 and 1858 was high. But one circumstance of importance is to be noticed,—viz., tha in this small institution very bad cases were frequently admitted to the exclusion o others. Thus, when I was House-Physician in 1847, it often happened that ther were only two or three empty beds out of the sixty devoted to medical patient although some eight or ten applicants for admission presented themselves. In s lecting from this number, but one rule guided me, and it was to choose the mo severe forms of disease. And, moreover, rather than send away any very bad ca an extra bed would often be put up. Clearly, under such circumstances, the deat rate must appear greater than where all comers can be received for treatment.

authorities the blood-cells have a great tendency to liquefy. Dr. Richardson says that in a case of typhus which he examined during life, the presence of ammonia in excess in the body was indicated by prominent signs. The chief of these were that the breath was so markedly ammoniacal that it coated acidified glass with crystals of the chloride of ammonium, and restored the blue color to reddened litmus; the blood-corpuscles were misshapen, agglomerated, and partially dissolved, precisely as they are found when weak solutions of the alkali are added to healthy blood; while the symptoms were also those of alkaline poisoning. The foregoing tests are more delicate than that of holding a glass rod moistened with dilute hydrochloric acid before the mouth; though if when this is used, there is distinct evidence of white fumes, it is sufficient to prove that the amount of ammonia expired is beyond the normal proportion.

Treatment.—To prevent the generation of the typhus poison the poor should be supplied with wholesome food, while they must be housed in properly ventilated dwellings. The first requisite is not always possible; but man can live with a comparatively small amount of food, though to secure health an uninterrupted supply of pure air is necessary. We read with horror such stories as those of the Black Hole in Calcutta and of the Westminster Round House; but the effects of overcrowding among the poor are just as destructive though less speedily so.* In the common lodging-houses of the metropolis the police can enforce an allowance of 250 cubic feet of space for each inmate. Insufficient as this is, the regulation is evaded. In workhouses, the minimum space of 300 cubic feet is required for each bed, in wards occupied through the night only by healthy adults or children. The soldier, in barracks, has allotted to him a space of 600 cubic feet; 1200 being allowed in military hospitals.

Every hospital, workhouse, lodging-house, &c., should be thoroughly cleansed, and the walls lime-washed, at the least, once a year; and, of course, much oftener if any cases of fever have been in them. The propagation of the poison is to be checked by disinfecting the clothes, bedding, sponges, and towels, excretions and vomited matters, &c., of every typhus patient (F. 74, 75); by not allowing him to be taken to the hospital in a street cab or omnibus; and by the greatest attention to personal cleanliness. The room in which a case has been treated ought not to be reinhabited until it has been thoroughly purified with chlorine or sulphurous acid gas, been whitewashed or repapered, and been left with the doors and windows widely open for many days.

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* It was on June 21st, 1756, that the Black Hole in Calcutta was the scene of suffering alluded to. The night was close and sultry; and at eight o'clock 146 human beings, the majority Europeans, were placed in a dungeon 18 feet by 14. There were only two small windows, looking to the west, strongly barred with iron, from which those confined could scarcely receive any circulation of fresh air. In a few minutes every prisoner fell into a profuse perspiration, causing great thirst. Before nine o'clock every one's thirst was intolerable and respiration difficult. In the ravings for water and the attempts to get the little which was brought, some were trampled to death Before eleven o'clock one-third were dead. By half-past eleven most of the living were delirious. At six o'clock the next morning the prison was opened: only 23 were alive: and several of these died afterwards from fever. The event is graphically described by Mr. Holwell, one of the survivors, in the Annual Register for 1758. Second Edition, p. 278. London, 1761.

In the year 1742, the high constable and others of Westminster, committed to the Round House several persons whom they found in the street. Twenty-eight were sent to that of St. Martin, the keeper forcing them into a place called the Hole, not above six feet square, and with the ceiling scarce five feet ten inches high. He paid no regard to their cries of murder; so that four women were suffocated, one of whom was big with child. The keeper was afterwards found guilty of wilful

The curative treatment consists of the following measures. When it is possible, the practitioner should choose for his patient a large, well-ventilated apartment, which ought to be free from bed- and window-curtains, carpets, and superfluous furniture. The windows had better be open; in cold weather it suffices to have them down at the top for a couple of inches. Chloride of lime (F. 75), or a weak solution of chloride of zinc (F. 79), may be used as a disinfectant. Iodine (F. 81) is valuable for the same purpose; so is carbolic acid; and particularly so is sulphurous acid gas (F. 74). A fire in the room acts as a ventilator. All unnecessary intercourse between the patient and his friends, as well as between the nurses and domestics or residents, should be forbidden; the apartment ought to be kept quiet, neither whispering nor rustling dresses being allowed; while care must be taken to select one or two cheerful and experienced nurses, since much depends upon their fidelity and competency.

If the patient be treated in an hospital, the ward ought to be so arranged that each inmate may have from 1500 to 2000 cubic feet of air-space; the beds are to be six feet distant from one another; and there is to be such ventilation as will at least insure from 30 to 40 cubic feet of fresh air to every sufferer for every minute in the twenty-four hours.

During the early stages, and throughout the whole course of mild cases, it is particularly necessary to beware of doing too much—of interfering too actively with the natural progress of the disease. It ought to be remembered that we are able to treat, but cannot cure these maladies, any more than we can cure small-pox or measles; and, therefore, our aim must be to keep the patient alive until the fever poison has expended itself. In

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murder and transported.—The Principles of Forensic Medicine. By John Gordon Smith, M.D. Third Edition, p. 221. London, 1827.

Of course it will be said that such atrocities as those committed by Surajut Dowla and the keeper of the Round House could not take place in the present day. Perhaps not. But before we boast of our civilization it would be as well to look at the metropolitan dwellings of the working and dangerous classes in Bethnal Green, Spitalfields, Saffron Hill, the Coal Yard, Great Wyld Street, Dudley Street, &c. The admirable way in which the guardians of the poor save the pockets of the ratepayers, and generate crime and fever and death, would satisfy the most ultra disciple of Malthus. This is what Mr. Godwin saw in a cellar-dwelling at Bethnal Green: "Through the narrow space of the window that is left open there came a glimmering light, which fell upon two figures on a broken truckle, seemingly naked, with the exception of some black rags passed across the middle of the bodies; but the greater part of the room, small as it is, was in total darkness. In this profound depth our sagacious guide, Mr. Price, thought that there were more figures visible; and on asking if any were there, a female voice replied, 'Yes; here are two of us. Mother is out.' And gradually, as the eye became accustomed to the gloom, two other figures were to be seen lying in a corner upon rags. This was between twelve and one o'clock in the day. We were not disposed to look further into this mystery; but it was evident that one of the unfortunates was resting close to the damp and poisonous wall. Neither words nor drawing can convey a complete idea of this den, and its thick and polluted atmosphere. Instead of being filled with the pure life-giving air which is needful for human existence, it seemed occupied by something which might be moved and weighed. The height of the room, all of which is below the surface, is not quite six feet. The window would not open; the ceiling was ready to fall; and the walls, so far as the light showed, were damp and mildewed. The lodgers here were a widow and her four children; one a girl of twenty years of age, another girl eighteen, a boy of fourteen, and a boy of twelve."—Another Blow for Life, p. 14. London, 1864.

And we are told nothing can be done for evils similar to the foregoing—they are as unavoidable as the authorities in the days of Howard believed the generation of jail fever to be. There is a "law of suffering," it is argued. Some of our fellow-creatures must be allowed to rot in the wealthiest city of the world; though we complacently guard them from "spiritual destitution," and freely afford them the opportunity of praying for deliverance "from plague, pestilence, and famine."

opposition to this opinion, however, I must mention that Dr. Goolden, Physician to St. Thomas's Hospital, has informed me that, after more than ten years' experience, he regards quinine in large doses as almost a specific for cutting short cases of typhus and typhoid fever. He gives ten grains in solution, with a few drops of diluted sulphuric acid, every two hours, until an effect is produced—*i. e.*, until either the fever is lessened, or cinchonism is induced; and he has thus continued it for three days. He has also assured me that it may be given, even if there be diarrhœa with bloody stools; that he has never seen it do harm; and that it has saved hopeless cases. Quinine, when thus administered, acts on the nervous system and on the heart as a depressant; hence the patient's powers must be supported with beef tea, and wine or brandy.*

When the patient is seen early, it may, perhaps, be advantageous to commence the treatment by the administration of an emetic; the ipecacuanha wine in doses of one ounce, with plenty of warm water, or the powdered ipecacuanha with ammonia (F. 233), being preferable to antimony. At the same time a single dose of some mild purgative, to clear the intestines, will generally be useful. Then the dilute phosphoric or hydrochloric acids, or the aromatic sulphuric acid, in doses of twenty or thirty minims every four or six hours, freely diluted, may be administered with benefit. There are many advantages in giving them as the daily drink (F. 357, 358, 359). If it be true that the blood contains an excess of ammonia, these acids must act as valuable alteratives. All other medicines had better be avoided. Certainly it is seldom wise to prescribe the carbonate of ammonia; which, though useful as a stimulant, is likely to be injurious owing to its alkaline property altering the blood for the worse. Moreover, this salt sometimes seems to increase the perspirations, and to set up diarrhœa. At this stage, the patient's uneasy sensations will be much soothed by sponging the surface of the body with cold or tepid water two or three times in the day. Dr. Armitage speaks highly of the use of cold affusion, especially where there is a tendency to stupor, or where the delirium threatens to merge into coma. Sinapisms, or flying blisters over the pneumogastric in the neck, are also worth trying under such circumstances. When there is a great degree of irritability, the warm bath at 93° to 95° Fahr., prolonged for three-quarters of an hour, may be very useful. In cases where the acid drink is not prescribed, a free supply of toast-water, barley-water, plain water, lemonade, or raspberry-vinegar and water ought to be allowed. Ice is always very refreshing. The diet should be restricted to milk, farinaceous food, and thin broth well salted. Tea and coffee are probably useful in aiding the elimination of urea from the blood.

Directly the powers of life begin to fail—as soon as there is a signal loss of strength, a dark-brown tongue, a frequent feeble pulse, or an abruptness and weakness of the first or systolic sound of the heart, then a stimulating plan of treatment should be commenced. This consists in ordering strong beef or chicken tea, with carlowitz, or claret, or tokay, or the brandy and egg mixture of the British Pharmacopœia, or brandy. The last is, in my opinion, the agent generally to be preferred. It should be given in such quantities as the extent of prostration demands. One teaspoonful, or one dessertspoonful, or one tablespoonful, may be administered in water or milk, or beef tea, every two hours, or every hour, or even in bad cases each

* Dr. Dundas of Liverpool has also given evidence in favor of Dr. Goolden's views in his Essay on Fever, Medical Times, October, 1851. On the other hand, it has been shown by a large number of eminent authorities, that quinine thus administered, not only fails to arrest the disease, but often does much mischief. I confess to being skeptical as to its proving at all serviceable.

half hour the effect produced being closely watched, and the repetition of the dose guided by such effect, remembering that severe febrile symptoms do not contraindicate it. Where the utility of this or any other stimulant can be measured by the sphygmograph, so much the better. But independently of this valuable though not always handy instrument, we may be certain that a right course is being pursued, if after a few doses the pulse becomes less frequent and softer, and more equal; and if the anxiety of countenance be lessened, if the evidence of flagging be more limited, and if the trembling of the hands diminishes. Extra precaution is needed in the use of alcohol when the urine is scanty or albuminous, or when there is violent delirium, with throbbing pains in the head. A few doses, however, will show whether the delirium is increased or diminished by its use, and thus form a guide for the practitioner. Dr. Todd was in the habit of teaching that, to a certain extent, we may learn if we are administering more alcohol than is required, by noticing the state of the breath. Thus, supposing the breath to be saturated with the smell of alcohol when twenty or thirty minutes have elapsed since the exhibition of the last dose, then it is probable that the stimulant is being pushed too far, and that it is exerting an injurious narcotic action. Under such circumstances the alcoholic remedies ought to be at once diminished. On the contrary, if we can reasonably believe that benefit is arising from their employment, then care must be taken to regulate the dose and the intervals which may be allowed between each administration. Supposing the frequent exhibition of the stimulant to be called for, explicit directions are to be given not to allow the patient to sleep too long without it. Nurses and friends are naturally unwilling to rouse a patient who may have previously been without sleep for days, to give him his nourishment; but unless they do so at each appointed hour, he is not unlikely to awake and pass into a state of fatal collapse.

Where there is much general irritability and sleeplessness, without any lung complication preventing the due aeration of the blood, a well-timed dose of opium will work wonders; it being better to give about half a grain of the extract every three hours until the patient is calmed, than to administer a single large dose. Frequently I combine it with henbane. Sometimes this drug alone has seemed sufficiently soothing, but it will be useless to give less than eighty or one hundred minims of a good tincture. Where the sense of hearing is very sharp, Sir Dominic Corrigan recommends stuffing the ears with wool. If there be much headache, or injected conjunctivæ, or active delirium, the opium should be guarded with a small dose of ipecacuanha, or perhaps even of tartar emetic, as recommended by Dr. Graves. Some cold lotion, or a bladder containing ice, may also be cautiously applied to the scalp; cold affusion over the head can be tried; or, if we fear any cerebral effusion, small blisters may be put on to the temples.

The secondary affections which occasionally arise are not to be looked upon as contraindicating the use of stimulants. The true test for their need is still the force of the circulation. I am sure that I have seen fever prove fatal, because the practitioner has thought that pneumonia was present, and has been consequently afraid to administer wine or brandy. But while giving stimulants in these pulmonary disorders, we ought also to apply turpentine stupes to the chest, or sinapisms, or plain linseed poultices. The softening and fatty degeneration of the muscular fibres of the heart which may occur, show how important it is not to neglect the use of nourishment. Then, in every instance, whether the fever be running a regular or complicated course, the skin over the hips and sacrum and other promi-

l at once begins to mend, gaining power and sleeping much as he
A course of the mineral acids and bark (F. 376), or of quinine
F. 380), with a gradual return to solid food, will ultimately com-
ure.

ERIC FEVER.—Enteric or typhoid fever is an endemic, slightly
disease; which is most prevalent in autumn, and is generated by
animal matter. The effluvia from foul drains, or the contami-
drinking-water by the decomposing sewage making its way into
are the frequent sources of this disorder. Where the simplest
laws are grossly neglected, there enteric fever will revel. It
ch and poor indiscriminately; but the latter, in their small homes,
ıle than the former to avoid the injurious influences which flow
nuisances, and the distribution of polluted water. This fever is
ularly a disease of early youth and adolescence, though more
hen than at a greater age.

(long known as *typhoid*) fever has been described under many
ıch as *abdominal typhus*, *ileo-typhus*, *febris putrida*, *gastro-bilious*
is gastrica, *febris mesenterica maligna*, *night-soil fever*, *infantile re-*
ver, and *typhia*. In some parts of America it is known as the
or *fall fever*. In the present day many writers justly object to
ation Typhoid; since, in the first place, this term literally means
phus" [*Τῦφος* = stupor + *εἶδος* = appearance], and the disease
lly different; while, secondly, the word is often used as an adjec-
signate a set of symptoms which come on in the course of many
ases, whence there arises confusion. It has therefore been pro-
all it *Enteric fever* [*Ἔντερον* = an intestine]; a term which seems
e adopted by general consent, although it is rather undesirable
name derived from the abdominal lesion, as such may lead to the
n that the intestinal ulceration is the cause, instead of the result,
er. It was on this ground that Dr. Murchison, looking to the
the affection, suggested the apellation of *Pythogenic fever*,—
from *πύθων* (*πύθομαι* = *putresco*) + *γεννάω*,—literally, "born of
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—Dr. William Budd has urged with great force that the poison
l fever, instead of originating in decomposing sewage is merely

not completely arrested. (2.) There are numerous instances of enteric fever appearing in houses having no communications by drains with any other dwelling: *e. g.*, isolated country houses. (3.) There is no evidence that the stools of enteric fever are of such a virulent nature as has been stated. The attendants on the sick are rarely attacked. Pigs suffer from enteric fever; yet a pig fed for six weeks on the excreta of typhoid fever patients, got very fat and continued well. (4.) The fact that the prevalence of the disease is influenced by temperature is opposed to the idea that it depends on a specific poison derived from the sick; but is readily accounted for on the supposition that the poison is generated by fermentation or decomposition.*

Allowing therefore that the disease is probably generated spontaneously by the decomposition of fecal matter, we should expect to find it most prevalent after the long heat of summer. And such is really the case; for this fever is most common during the autumn and early winter months, subsiding as great cold sets in. Inasmuch, too, as it is not dependent on overcrowding, so the rich and poor suffer equally from it. Enteric fever proved fatal to Prince Albert, on the twenty-first day from the time of seizure, on December 14th, 1861. The disease may be carried by the infected into healthy localities; but it is very much less contagious than typhus and relapsing fever. The infantile remittent fever of England is, as will be presently mentioned, merely enteric fever, somewhat modified by the tender age of the sufferer.

Symptoms.—The attack may occur immediately on exposure to the poison, especially where the latter is concentrated, beginning with vomiting and purging, so that such cases have given rise to a suspicion of poisoning by one of the irritants, or narcotico-irritants. In most instances, however, there is a period of incubation; which, according to Dr. W. Budd, varies from ten to fourteen days. Then the disease usually sets in slowly and insidiously; the sufferer feels languid and uneasy without being exactly able to define the nature of his sensations, his bowels are probably inclined to act more freely than customary and the stools are pale, while there is a sense of anxiety, with fatigue and aching about the body. In the course of a day or two (or in exceptional cases not until the lapse of several days) he has chills, headache, intolerance of light, thirst, complete loss of appetite, a tongue red at the tip, but elsewhere coated with a creamy fur, and pains in his limbs; followed by a sense of weakness, a rather frequent dicrotous pulse, tenderness about the abdomen on pressure, a tendency to sickness and diarrhœa, more or less wakefulness, and a disinclination to sit up. At night there is great heat of skin (even to 104°) and restlessness; while the bed is complained of as being hot and uncomfortable, change of posture gives no relief, and the patient is tormented by a fierce thirst which nothing seems to assuage. The expression of the countenance now gets altered; being either very languid and pale, or marked with a circumscribed flush on each cheek. The eyes have a sunken appearance. The urine is diminished in quantity, high-colored, and acid; having an increased amount of urea and uric acid, while the chloride of sodium is lessened perhaps to a trace. At times, a little albumen may be present. Now and then there is retention of urine, requiring the use of the catheter. There is great loss of strength. The fever assumes a hectic character, and runs high towards the evening. In severe cases the pulse rises above 120, and gets feeble and irregular; the respiration begins to be rather hurried, and the breath offensive—perhaps ammo-

* "On the Causes of Continued Fevers." The London Medical Review, p. 505. April, 1863.

niacal; the lips become parched and cracked, and the tongue dry and brown or red and glazed; there is great depression; and withal considerable abdominal tenderness, especially near the right iliac fossa.

These symptoms either continue somewhat stationary, or slowly become aggravated: until at the commencement of the second week the characteristic eruption generally begins to show itself on the chest or abdomen, in the shape of rose-colored papules. These spots hardly exceed a line in diameter, they are few in number, are circular, disappear temporarily on pressure, and fade away in two or three days to be replaced by a fresh crop; this latter going through the same course, and so on again and again until the end of the fever. They are seldom accompanied by true petechiæ. Although the rose-colored rash is never met with in any other cases, yet it is certain that typhoid fever may sometimes run its career without our being able to discover a single spot. Dr. Tweedie thinks that in ten or twelve per cent. the rash will be absent. Occasionally, sudamina also appear about the end of the second week on the neck, chest, abdomen, or inguinal regions; while the temperature lessens, and at different times of the day the skin is found covered with sweat.

Amongst the other symptoms which may be present after the middle of the second week, we frequently have mental confusion and somnolence; these being followed by delirium, at first slight, but soon getting violent. Perhaps too, there are spasmodic contractions of many of the muscles, and hiccup; tinnitus aurium, or deafness; muscular pains with debility; a pinched or attenuated state of the features, with occasional hectic flushes on the cheeks; and bed-sores over the sacrum. There will be likewise increasing, and often extreme, loss of flesh and strength; a tongue which is of a dirty brown color, and dry and fissured, these cracks being painful and often bleeding slightly; dilatation of the pupils, unless there be great stupor, when they are contracted as in typhus; and occasional attacks of epistaxis. The belly is found enlarged, and resonant on percussion; while careful pressure in the right iliac fossa usually produces pain and causes gurgling. At a later stage, meteorism or considerable tympanites, from the accumulation of air in the colon, may give rise to much distress, and require to be relieved by the passage of a long stomach-pump tube. There is sometimes nausea and sickness. As a rule there is diarrhœa; which generally increases towards the end of the second week, so that there may then be eight or ten stools a day, some of them containing blood and others having the appearance and consistency of pea soup. These stools are remarkable in being alkaline (instead of acid, as healthy ones are), of a peculiarly offensive and putrid character, and for containing a large quantity of ammoniaco-magnesian phosphates with little shreds of sloughs. As the diarrhœa sets in, the pulse increases in frequency—often to between 130 and 140; while the evening temperature of the skin again rises, to the height even of 105° or a little more. Occasionally we have also serious attacks of hemorrhage from the ulcerated patches in the ileum and cæcum; one of which losses may either produce fatal syncope, or so depress the patient that he has no power left to bear up against the continuance of the disease. Another great danger to be feared is the extension of the ulceration till the coats of the bowel are perforated; an occurrence which may take place and cause fatal peritonitis at an advanced stage of the fever, or even just as we have reason to hope that convalescence is setting in. This chance of rupture must also be remembered by the physician on examining the abdomen by palpation; while it ought certainly to forbid the employment of purgatives after the lapse of the first two or three days from the setting in of the disease. The symptoms of intestinal perforation are well and curtly laid down by Louis,

who says that "if in the course of a severe or slight typhoid affection, or even under unexpected circumstances, the disease having been latent to that moment, there supervene suddenly, in a patient with diarrhœa, abdominal pain aggravated on pressure, altered expression of the features, and more or less quickly nausea and vomiting, there must be perforation of the small intestine." In the event of this occurring, the case is not to be given up as absolutely hopeless. Once in a way the exhibition of full doses of opium, with the administration of nourishment by enemata only, may rescue a patient from what looks like certain death.

There are yet more perils which jeopardize life. Thus, as in typhus, we may have to deal with one or other of the varieties of cerebral disturbance; or with congestion of the kidneys, impeding the elimination of urea and leading to convulsions; or with an attack of erysipelas; or a pulmonary affection may be set up, such as bronchial catarrh, congestion of the lungs, pleurisy with effusion, and pneumonia. Occasionally, suppuration has occurred; one or more large abscesses forming in the muscular tissue, or in a joint, or even in an internal organ. In a few instances, gangrene of some portion of the body—as of the penis, vulva, or one of the extremities, has happened; this result being possibly due to obstruction of the chief vessel of the part by a thrombus or clot. But independently of any of these complications the disease may destroy life from the simple exhaustion which it induces, though this occurrence is rare. When this fever occurs during pregnancy, abortion mostly takes place: sometimes the expulsion of the fœtus is followed by fatal prostration, especially if there be flooding.

Enteric fever is often prolonged to the thirtieth day, and in some instances is followed by a relapse. The termination is usually by insensible resolution; though now and then a critical diarrhœa, or sweating, or both combined, or bilious vomiting, has been observed. Slight desquamation of the cuticle, particularly of that covering the abdomen, may succeed the disappearance of the febrile phenomena. During convalescence, as happens also after relapsing fever, a venous murmur in the neck may not unfrequently be heard; while on ausculting the heart an inorganic systolic bruit can often be detected, having the soft blowing character generally observed in anæmic murmurs. Dr. Stokes states, that it usually disappears or diminishes on the patient assuming the erect position; while it is quickly cured when tonics and suitable nourishment can be borne. I am inclined to believe, however, that enteric fever may occasionally produce permanent valvular disease; while I have seen cases where fatty degeneration of the muscular fibres of the heart has appeared to have its origin in an attack of this disease some years previously to the cardiac mischief getting sufficiently troublesome to attract attention.

Morbid Anatomy.—It is only necessary to allude, under this head, to those alterations which are found in the ileum, probably as the *result* of the fever poison; since they constitute the true pathological peculiarities of enteric fever. We may find, it is true, congestion of the brain or its membranes, or ulceration of the œsophagus, or softening or ulceration of the mucous membrane of the stomach, or an augmentation of the volume of the liver with a diminution of its consistence, or enlargement and softening of the spleen; but then these changes are in no way to be regarded as essential elements of enteric fever. The two lesions which may be said to be invariably present, are certain changes in Peyer's patches, and in the corresponding glands of the mesentery. The *alterations in the agminated glands or Peyer's patches* are the most marked in the groups of glands which are nearest the ileo-cæcal valve. Where the case has terminated fatally at an early stage, we may merely detect a swollen condition of the mucous mem-

over the diseased patch; or we shall, perhaps, find the typhoid de- more or less copiously effused into the solitary glands, as well as into tissue of Peyer's patches. But death generally happens at a later d, towards the end of the third or beginning of the fourth week, and we observe that the patches have undergone ulceration; the fever prod- having been transformed into a brownish slough, which has become ded, and has left a cavity or ulcer of a size varying from a pea to a n. Perhaps one or more of these ulcers, instead of cicatrizing, will been the immediate cause of death, owing to their extension until per- ation has happened and allowed the escape of the intestinal contents into peritoneum. The *mesenteric glands* in the neighborhood of the patches very generally enlarged and softened; and occasionally they have been in this condition when the intestinal lesion has only been very slight.

Prognosis.—The most unfavorable symptoms are hemorrhage, persistent rrhœa, a very frequent pulse, and great heat of skin. Continuous de- ium with muscular twitchings, or lively jactitation, forebode an unfavora- termination.

When death occurs it usually happens between the twentieth and thir- h day. The most frequent cause of a fatal termination is perforation of bowel; hemorrhage standing next. Cerebral and pulmonary complica- ns also tend to swell the mortality.

A lessening of the temperature of the skin, provided it does not fall be- 97°, and a copious eruption of sudamina over the chest, are among the st certain forerunners of recovery.

Treatment.—The prevention of this disease is to be accomplished by good inage. If an old cesspool be found in or under any house, the inhabi- nts of the latter should leave while the contents of the privy are being ried away. Water contaminated by leakage from a sewer is poisonous. guard against the transmission of the fever, the patient's excreta should passed into a bed-pan containing Condy's Fluid (F. 74).

The curative measures are in most respects the same as those required in phus; but there are two or three exceptional points which require notice. When the disease is seen at its commencement emetics do good; and we y prescribe an ounce of ipecacuanha wine every eighteen or twenty-four urs for the first three days. Aperients, however, should seldom be given, the bowels will most probably act spontaneously; but if they do not do a dessertspoonful of castor oil, or a wineglassful of fluid magnesia, or a mple enema may be administered.

With regard to the intestinal irritation and continued diarrhœa, no rem- lies are so useful as bismuth, catechu, rhatany, logwood, &c., in combina- n with small doses of opium (F. 97, 105, 108, 112). Sulphate of copper d opium (F. 106) often answer admirably; while a pill of these materials ill help also to check the hemorrhage which is so apt to happen. En- mata of ten or fifteen minims of the liquid extract of opium, in two ounces mucilage of starch, often give much relief; or when there is much tym- nites, a few minims of turpentine and opium, or of solution of morphia th bismuth (F. 113) are useful. Suppose there are symptoms indicative irritation from the retention of offensive secretions, these matters ought be gently got rid of by enemata of warm water; which will not only e to wash out the rectum, but also to excite the peristaltic action of the s of the bowel, by which the contents of the upper parts of the gut will rged onward. When peritonitis is actually present; or when, in con- tion with abdominal tenderness and increased frequency of pulse, there sudden rise in the temperature of the body to 105° or even more, show- a strong tendency to abdominal inflammation: then, in either ca

opium is the remedy. The best preparation is the extract, in small pills, in doses sufficient to annul pain and tenderness. Simultaneously, the belly is to be covered with the extracts of belladonna and poppies (F. 297) and a light linseed poultice, or with poppy fomentation flannels. If there be hemorrhage from the bowels, we must carefully apply cold over the abdomen, and administer gallic acid with opium (F. 103). The ammonia iron-alum (F. 116) is also an excellent styptic. Ice to suck is useful. In such instances the patient ought to be assiduously watched by his medical attendant; while wine or brandy is to be administered in exact proportion to the demand for stimulants by the system. The skill of the physician is shown by his commencing the remedy at the proper time, and administering it to the requisite amount: but this power can only be acquired by assiduous study at the bedside.

During convalescence greater care will be required than after other forms of continued fever; since any irritation applied to a cicatrizing ulcer in the ileum will possibly affect it unfavorably, and re-excite that morbid action which may end in perforation. Milk and raw eggs, as well as cod-liver oil, are invaluable. Six ounces of port wine or good claret, or two ounces of brandy, should be allowed daily until the pulse has fallen below 100. Tonics are to be carefully given; none being more suitable in the commencement than some preparation of bark. The return to a generous diet must be very gradual; beginning with puddings of ground rice and milk, and progressing to white fish and chicken panada and mutton. But it cannot be too strongly insisted on, that no solid food is to be allowed until the diarrhœa has ceased, the tongue become clean and moist, the pulse got soft, and till all feverish excitement has vanished; until which time, also, the patient should neither be allowed to leave his bed, nor even to sit up much in it.

I know of no place better than the present for making a few observations on enteric or typhoid fever as it occurs in children; remarks on this disease being the more needful, inasmuch as confusion has arisen from improperly naming it INFANTILE REMITTENT FEVER. Discarding this term, it is to be noticed that enteric fever happens during childhood in two degrees; *i.e.*, in a mild and in a severe form. The cases which terminate fatally are few in number, and usually belong to the second class. Dangerous complications, however, may occasionally happen during the progress of the less severe variety.

In cases of the first, or the *mild* kind, the disease comes on very gradually. Generally, the earliest symptoms that attract attention are loss of appetite, great thirst, and mental depression, so that the child is no longer lively and cheerful. During the day also it is listless and indolent and peevish; while though drowsy towards the evening, yet its nights are restless, and there is a want of sound refreshing sleep. When these indications of ill health have persisted for a few days, it is noticed that the skin is hot; at some hours of the day being dry, at others covered with perspiration. The breath is very unpleasant. The bowels are generally loose, the evacuations being unhealthy and offensive; although sometimes there is obstinate constipation. At the beginning of the second week the symptoms increase. The child passes very bad nights; screams, moans, grates its teeth, and starts in its sleep; suffers much from thirst, and occasionally from sickness and vomiting; and perhaps has slight delirium. There is exacerbation of the fever towards the evening, with remission as the morning approaches; occasionally there is a second though less severe exacerbation about eleven o'clock in the morning. In mild cases there is seldom a rash; if any ap-

ıd the mind wanders at night, so that the child sits up or tries to
bed, does not know its nurse, and looks about the room in a
ightened manner. The skin is very hot and dry; the pulse gets
ıent. From the sixth to the tenth day a very scanty eruption of
makes its appearance upon the back, thorax, or abdomen. As
e progresses, the restlessness and delirium become aggravated; the
dry, brown, and glazed; the abdomen is found tumid and tender;
respiration is accelerated, and there may be cough, with a feeling
ion at the chest. There is generally diarrhœa; the urine is scanty
colored; and perhaps the evacuations are passed unconsciously.
d of the second week, the patient is reduced to the most emaciated
ess state; until, when apparently in the worst possible condition,
ıs of amendment show themselves. Day by day the improvement
and at the end of several weeks health is restored.
ng the disease should terminate in death, the prominent post-
ıppearances will consist probably of slight congestion of the
nembranes, engorgement of the lungs, softening of the spleen,
ınt of the mesenteric glands, and more positively of tumefaction
ıtion of the agminated glands or Peyer's patches.
ver has to be managed on the same principles as those laid down
ıg the adult through an attack. Medicines are to be avoided as
possible; none in fact being required unless there be much pain,
ve diarrhœa, or hemorrhage. Milk freely given proves very ser-
while raw eggs, strong beef tea, cod-liver oil, and perhaps wine
ıe required. During convalescence, sea air has a valuable influ-

CEREBRO-SPINAL FEVER.—Although for the last sixty years
demics of cerebro-spinal fever have occurred at different parts
e and America, yet our knowledge of the disease is recent and
e. Partly on this account, and partly because this fever is some-
ked by a variety of symptoms it is difficult to define it briefly.
ıowever, attempt to describe it as a malignant epidemic fever,
vith lesions of the great nerve centres (the brain and spinal cord)
y of their surfaces and membranes. Eruptions of various kinds,
ımmonly of a purpuric character, are present in about half the
cases; in acute headache, vomiting, contraction of the muscles of

purpuric fever, malignant purple fever, epidemic cerebro-spinal meningitis, cerebro-spinal typhus, neuro-purpuric fever, and *spotted fever.* By the French it is known as *Fièvre cérébro-spinale,* and *Fièvre purpurée maligne;* by the Germans, as *Epidemische meningitis;* and by the Italians, as *Febbre cerebro-spinale.*

Causes.—On this head, there is little to say beyond this: that all attempts to explain the origin of the various epidemics, or to bring them within the circle of those laws which apply generally to diseases of the zymotic class have failed. Most of the epidemics have occurred in the cold seasons of the year; but there have been many during the warm months, especially in France and Sweden. Still it must be allowed, that the development of the disease is favored by cold. The inhabitants of high and low districts, of salubrious and insalubrious localities, of ill- and well-drained towns, have suffered alike from cerebro-spinal fever. It has generally been remarked, that males are more prone to this disease than females; while vigorous youths have been attacked in greater proportion than those advanced in life. Vieusseux, in giving the first authentic history of an epidemic of this fever, which occurred at Geneva, in 1805, says, that it attacked people of every rank at once; the poor and rich, the inhabitants of dirty and crowded rooms in unhealthy districts, as well as the residents in great houses, where well-aired chambers had but a single occupant.* The experience of recent years has shown that cerebro-spinal fever is especially apt to break out in establishments where numbers of people are congregated together, as in barracks and work-houses and prisons. But even here the disease shows a peculiarity; since it attacks soldiers in a larger proportion than paupers or convicts. There is a great difference of opinion as to whether the disease is communicable by the sick to the healthy. The evidence, especially that derived from the French military experience, in favor of its being slightly infectious, seems somewhat difficult to combat. The members of the Massachusetts Medical Society were "very generally agreed," however, as to its non-infectious character; and they report that out of 268 cases in which the question was asked as to the origin through contagion, the replies were in the negative, so far as 252 were concerned.

Symptoms.—This fever assumes such a multiplicity of disguises that it has been divided by different writers into several classes. But however varied the symptoms, the disease is essentially one. Just as confusion would arise in the description of enteric fever, if one set of observers paid attention chiefly to the general fever, while another class only regarded the diarrhœa and other intestinal symptoms, so it has happened with cerebro-spinal fever. In enteric fever, we have a blood disease with intes-

* The epidemic as described by Bascombe, as occurring about the close of 1802, in the small Franconian town of Roettingen, situated on the river Tauber, and surrounded by mountains, seems to have been of the nature of cerebro-spinal fever. After a very hot and dry summer, there were thick fogs, and incessant heavy rains, during November. Towards the end of this month "an extremely fatal disease broke out, which was without example in the memory of its oldest inhabitants, it being totally unknown to them previously. The young and strong were suddenly seized with pain and anguish at the heart, with violent palpitations, and lacerating pains in the nape of the neck: profuse, sour, ill-smelling perspiration broke out over the entire body; and a suffering, as though a violent rheumatic fever had seized on the tendinous expansions, accompanied this terrible malady: in the worst cases, a spasmodic trembling ensued, the patient fainted, the limbs became rigid, and death closed the scene, frequently within twenty-four hours from the commencement of the attack." A History of Epidemic Pestilences, from the earliest ages, 1495 years before the birth of our Saviour to 1848, p. 147. By Edward Bascombe, M.D. London, 1851.

inal lesions: in cerebro-spinal fever there is a blood disease with lesions f the great nervous centres or their membranes. With both enteric and erebro-spinal fever, life may be destroyed in less than eighteen or twenty- our hours, by the force of the blood-poison—probably by necræmia or lissolution of the blood; although in both fevers, the disease is usually of a milder type, in the one case accompanied with symptoms of intestinal inflammation and ulceration, in the other with symptoms of inflammation of the cerebro-spinal axis or its membranes.

The symptoms by which cerebro-spinal fever almost invariably manifests itself are chilliness, or actual shivering, giddiness, severe headache, and irrepressible vomiting; these being quickly followed by feverishness, a sense of mental and bodily prostration, and sharp pains, with stiffness in the muscles of the back of the neck. And these different symptoms usually come on suddenly in the midst of apparent health; so that sometimes the sick man can scarcely be persuaded that he has not been wilfully poisoned. This opinion gets confirmed also, if, as may happen, the symptoms succeed each other with such rapidity that in an hour or rather more the patient has become very seriously ill. Often, however, there are premonitory indications of illness, which are neglected; and the effects of the fever show themselves more gradually through a space of one or two days. Certainly, the closer their sequence on each other, the greater will be the severity of the attack. In any case, the disease produces results which assume an alarming aspect more or less speedily. Neuralgic pains, with tenderness of the affected parts, give rise to hideous cries. The headache becomes incessant, and most distressing; the countenance gets livid or pale, anxious and pinched; and there is miserable restlessness, with some mental confusion. The tongue, pulse, and temperature of the body are scarcely affected at this stage. The bowels may be constipated or loose; but the former state is that mostly observed. The cramps and muscular agitation seem to dart all over the body. At the upper part of the spine, and in the tissues at the nape of the neck, there is severe aching; while the muscles there are frequently contracted, drawing the head backwards, and fixing it rigidly. Deglutition is difficult. Trismus is common; with convulsive and uncontrollable muscular contractions at different parts of the body, as in tetanus. Hallucinations and delirium set in early, sometimes proving violent within the first twenty-four hours. Through the night, the patient seems to doze, dream, and wander; starting up every few minutes in a kind of wild maniacal excitement, as the racking cramps rouse him into a state of semi-consciousness.

While time advances—as the fifth or sixth day is reached, the pulse increases in frequency, the eyes get bloodshot, and the pupils are often contracted or irregular; the corneæ and retinæ perhaps become inflamed; the tongue becomes dry and shining, or brown and covered with sordes, while the temperature in the axilla may be found as high as 102° Fahr. An eruption generally appears on the skin, consisting either of patches of herpes about the face or lips, or of a rash like that of measles, or roseola, or typhus, or of petechiæ, or of extensive purple ecchymoses. Meantime, the progress of the disease about the nervous centres is lessening the sufferer's consciousness; the heavy stupor which sets in being attended with great loss of power, tremulousness, imperfect vision, deafness, relaxation of the sphincters, and an inability to swallow. With the failing circulation and innervation, the respiratory movements get embarrassed. The urine may be retained only, or there may be suppression; sometimes it is found loaded with albumen. The prostration becomes excessive. Frequently the exhausted and emaciated frame seems hardly to be the seat of life, so deep is the coma, and so com-

plete are the paralysis and anæsthesia. In other instances the characteristic features of tetanus predominate over all others almost till the last; the countenance having the horrid grin of lockjaw, while the contraction of the muscles of the back is keeping up a state of rigid opisthotonos.

Where the disease is not of such an abrupt or explosive form (*méningite foudroyante*) that death occurs at the onset from collapse, the unfavorable cases may run on for five or six or eight days before life is destroyed. Of fatal cases, it is probable that seventy-five per cent. die before the close of the tenth day. The most dangerous time is from the second to the fifth day. Where the symptoms are less grave, the progress towards recovery is almost sure to be slow. There is a liability to relapse; at any moment the primary symptoms may return and prove fatal. The stage of convalescence, too, is apt to be interrupted by such secondary diseases as pericarditis, pleurisy, bronchitis, pneumonia, enteritis, abdominal neuralgia, seropurulent effusions into the joints, persistent headache, bed-sores, various forms of ophthalmia, and inflammation with ulceration of one or both auditory canals. In a few instances there have been fits of epilepsy. The muscular paralysis frequently continues for a time, but ultimately passes off; and so with the nervous exhaustion and mental disturbance, the intelligence very seldom being permanently damaged. Exceptions to this last remark have been met with, however, especially amongst young children; many of whom have been left idiotic, or blind, or deaf, or deaf and dumb for life.

Diagnosis.—The diseases with which this fever has been most frequently confounded are typhus and enteric fever, idiopathic tetanus, sporadic spinal meningitis, and malignant measles.

A brief recapitulation of the most important symptoms will aid the practitioner in his attempt to form a correct opinion. The most prominent and constant phenomena are the following: *Headache*, which comes on very early and suddenly, is very severe, and is either paroxysmal or persistent to the end. *Vertigo*, often accompanied with faintness and dimness of sight on the patient trying to assume the erect posture. *Prostration*, so great and so rapid as to form a striking feature. *Delirium*, varying from transient wandering to violent mania. *Coma*, a sign of most unfavorable import when deep. *Cutaneous hyperæsthesia*, so that the patients feel sore and ache all over, and groan or struggle when moved. *Darting pains in the limbs and spine*, sometimes compared to shocks of electricity, and causing faintness and sickness. *Neuralgia*, especially of the bowels, so marked in some epidemics, that the disease has been popularly known as bellyache. *Tetanic spasms*, the result of the spinal lesions, and of variable severity according to the extent of the changes in the cord and its membranes. *Paralysis*, usually partial. The muscles of deglutition are perhaps those most frequently affected. The power of motion is generally regained at the end of a few weeks, as the process of absorption removes some exudation which has caused pressure on the nerves at their origin. *Vomiting*, which is irrepressible; and, as in all cases of cerebral sickness, continues whether there be anything in the stomach to be ejected, or not. Rarely, the matters thrown up contain altered blood; green, bilious fluids are more frequently seen. *Constipation* is not constant, but it is often present as in other cerebral affections. *Cutaneous eruptions* are more common in some epidemics than others; while of the different kinds of eruption, labial herpes and petechiæ have been seen more frequently than purpuric spots or large ecchymoses. Neither *increased heat of skin*, nor *frequency of pulse*, nor *difficult respiration*, nor *albuminuria*, nor *swelling of the parotid or sub-*

axillary glands, nor *strabismus*, nor *lesions of the organs of sight or hearing*, an be called prominent symptoms of this fever, though they may be esent.

Prognosis.—The death-rate in different epidemics has varied between ide extremes. Under any circumstances the disease is a very dangerous ne, and therefore it is fortunate that it does not prevail in large epidemics. L. Boudin has collected the statistics of thirteen epidemics, in which there as a total of 1304 patients with 809 deaths. During the winter of 1863–4 the American army suffered much from this disease, the deaths being 70 er cent. of those attacked. The epidemic which prevailed about Dantzic province of West Prussia) in the commencement of 1865 was very fatal. he mortality at the Hardwicke Hospital in Dublin, in 1866, was not less han 80 per cent.

The mortality seems to be greater in those under 14 years of age, than n such as are between 14 and 35. After this latter year, the danger is much increased. When life is prolonged beyond the fourth day from the commencement of the attack, the gravity of the prognosis lessens. Still it is not to be forgotten that fatal relapses have occurred during convalescence. The most unfavorable symptoms are a preternaturally slow pulse; rigid retraction of the head; general convulsions; incontinence of urine; albuminuria; coldness of the skin, with a diffused purplish hue; indifference as to the issue; paralysis of the muscles of deglutition; dilatation and insensibility of the pupils; and especially deep coma. Recovery after violent delirium is not uncommon; but when the patient has become profoundly comatose, there is scarcely any hope. All complications greatly aggravate the danger; those which especially do so being pericarditis, pneumonia, pulmonary collapse from obstruction of one or more bronchi, the formation of large bullæ with gangrenous spots, obstinate vomiting, and profuse diarrhœa.

Duration.—Life has been destroyed by this disease in less than five hours. Dr. Mapother has quoted a case in which death occurred in four hours and forty-five minutes from perfect health. Probably one-third of all the fatal cases have not had a longer duration than forty-eight hours, if so long. In many instances death has occurred between the fifth and eighth days. On the other hand, patients have lived five or six weeks and then died just as recovery seemed probable. Some epidemics have been more rapidly fatal than others. When the acute symptoms have subsided, there is still a certain amount of danger from intense exhaustion during the tedious and irregular convalescence which frequently follows. Neuralgia, headache, dyspepsia, palpitation of the heart, stiffness of the neck, &c., will often retard the patient's progress. Relapses too are not uncommon. In favorable cases, a period varying from fourteen days to six months may elapse between the day of attack and that of complete recovery.

Morbid Anatomy.—The essential lesions are characteristic, and are always present save in the explosive (foudroyante) form of the disease. They consist of hyperæmia of the membranes of the brain and spinal cord, gelatinous or purulent exudations, and certain changes in the intimate composition of parts of the nervous centres. On opening the skull and the spinal canal, the dura mater is seen congested; while the sinuses are full of soft black coagula. The vessels of the arachnoid are found distended with blood, and the membrane itself opaque and thickened. The pia mater is not only congested, but its meshes are also infiltrated with a purulent exudation. The amount of this exudation, and the extent to which it is diffused, vary in different cases. The arachnoid cavity and the cerebral ventricles often contain a notable amount of serum. Several deposits of

lymph or of pus, more or less extensive, have been found at different parts of the surface of the brain, on the medulla oblongata, on the inferior portion of the cerebellum, and on the spinal cord.

The substance of parts of the brain, especially the surface, is frequently softened; and the spinal marrow has now and then been seen reduced to a mere pulp. Sometimes there are accumulations of pus at the base of the cerebrum and cerebellum, as well as in the spinal canal.

Treatment.—The three remedies which have hitherto been most largely used, and which have only served to lessen the patient's chances of recovery, are bleeding, purging, and calomel. The application of cold to the head and spine, by means of ice or freezing mixtures in India-rubber bags, has appeared to be of service and is deserving of further trial. The cautious subcutaneous injection of morphia with atropin (F. 314) into the nape of the neck seems to me to be promising. Morphia alone has been employed very frequently, and has certainly relieved the neuralgic pains and spasms without doing any mischief; but I am not aware that the combination of the two drugs, as suggested, has been tried.

The complications and sequelæ of the disease must be treated on the usual principles. Quinine, belladonna, bromide of potassium, and iodide of potassium appear to be the medicines which have been most frequently required.

The regimen should be the same as in other severe fevers. Ice, iced drinks, soda water, cold tea, &c., to relieve the thirst, ought to be freely allowed; milk and nourishing broths, raw eggs and cod-liver oil, will prove serviceable if they can be taken; while stimulants are to be avoided until absolutely demanded by the flagging circulation. Where the vomiting is such that nothing can be retained on the stomach, attempts are to be made to combat the prostration by nutrient enemata (F. 21). Although it is doubtful if the fever be communicable from one person to another, yet it will be as well to recommend disinfection and isolation.

5. RELAPSING FEVER.—The names of *relapsing*, or *famine*, or *recurrent fever*, have been bestowed upon this infectious disease, owing to the fact that at a certain period of the convalescence there is a relapse of all the symptoms. Epidemics of it have been recognized, during seasons of famine and destitution, since 1739; and have been described under the various names of *five-day fever*, *seven-day fever*, *bilious remittent fever*, *recurrent fever*, *mild yellow fever*, *synocha*, *Irish famine fever*, and *typhinia* (Farr).

This disease is more common in Ireland and Scotland than in England. In the latter country, the Irish poor are the chief sufferers from it. Persons of both sexes and all ages are attacked. The poison may remain latent in the system for from two to four days, or its effects can be manifested immediately. It is less infectious than typhus. One seizure does not insure immunity from a subsequent attack.

The *symptoms* commence abruptly with rigors, frontal headache, muscular pains, and depression. Soon, febrile reaction sets in; and we find great heat of skin, anxiety of countenance, intolerance of light and sound, a white tongue, and a full rapid pulse. Complaint is made of urgent thirst; and often there is pain at the epigastrium, with vomiting of a bitter bilious fluid. In some cases, there is a great desire for food, but usually the appetite fails. When night comes on the symptoms become aggravated; giving rise to much irritability with sleeplessness, and occasionally to delirium. As the disorder advances there is also constipation, scanty high-colored urine, sometimes jaundice, and increasing prostration; though there

is never any characteristic eruption. True petechiæ and spots of purpura may form, as may also sudamina at the period of crisis. The pulse is frequent (perhaps 140 in the minute), the temperature in the axilla may be as high as 105°, or even one or two degrees above this; the pains in the back and limbs are severe, and there is much distress and restlessness; while occasionally complications occur, such as parotitis. But just as matters seem to be assuming a very threatening aspect, on about the fifth or seventh day, a profuse perspiration breaks out over the whole body, the fever disappears, the pulse falls to its normal standard, the appetite returns, the urine increases in quantity, and the patient is left almost free from the disease, though weak. The convalescent, of course, fancies that his troubles are over, and that tonics and nourishment will soon restore him. The apyretic interval, however, is short; for about the fourteenth day from the commencement of the disorder, or the seventh from the critical sweating, there is an abrupt relapse with a repetition of all the symptoms. Generally upon the third or fourth day perspiration again sets in, and for a second time is followed by complete relief. The debility is often considerable; while the return to perfect health is somewhat slow, especially in the aged and such as were previously in a bad condition. Moreover, it is not very rare that a second or third relapse takes place.

Troublesome *sequelæ* sometimes greatly retard recovery; such as muscular weakness, rheumatic pains in the limbs and joints, œdema of the legs and feet, bronchitis and pneumonia, suppuration of one or more enlarged lymphatic glands, boils, or ophthalmia. When relapsing fever occurs in pregnant women, it has a greater tendency than many acute disorders to cause abortion or premature labor: the fœtus is usually dead. The disease is seldom fatal; although sometimes death takes place during the progress of the fever, from sudden syncope, and occasionally more slowly from uræmic poisoning. During an epidemic of this fever, which prevailed at St. Petersburg, in the winter of 1864–5, the cases admitted into the civil and military hospitals numbered 7625, of which 836 died. This mortality was much above the average. No special lesion can be detected upon making a post-mortem examination; but often the liver is discovered to be enlarged from congestion, and still more frequently the spleen is found considerably increased in size.

The *treatment* is very simple. Gentle aperients will at first be required where there is evidence of intestinal atony, or of the retention of fetid secretions. Then we should order refrigerating drinks, a farinaceous diet, milk, and perfect repose. Where there is much irritability and pain, opiates are useful; while, if the prostration be great, wine and nourishment will be needed. Sponging the body twice or thrice in the twenty-four hours with vinegar and water, or tepid water, does good. The jaundice is best treated with the nitro-hydrochloric acid (F. 378). The headache can sometimes be relieved by dry cupping to the nape of the neck, by frequently repeated doses of nitrate of potash—which also keeps up the action of the kidneys, and by allowing the patient to drink freely of tea or coffee. Quinine has been frequently given in the hope of preventing the relapse; but neither this drug, nor any other, appears to have exerted a beneficial influence in this respect.

II. INTERMITTENT FEVER, OR AGUE.

Intermittent [from *Intermitto* = to give over for a time] *Fever*, or *Paludal* [*Palus* = a fen or marsh] *Fever*, or *Periodic Fever*, or *Ague* [perhaps from the Fr. *Aigu* = sharp], is a disease chiefly due to marshy miasms; in which the febrile phenomena occur in paroxysms, are ushered in by rigors, and end in critical sweats. During the intermission or apyrexial period there is good health; but at the end of a definite interval, the phenomena are repeated, and this happens again and again, until a cure is effected. In England, during 1866, the deaths of $\frac{\text{Males } 64}{\text{Females } 71}$ = 135 persons were registered as due to ague and its complications. This number is about 30 below the annual average, taking the total (1642) for the ten years 1857–66.*

Varieties.—There are three species of intermittent fever or ague, viz., the *Quotidian*, *Tertian* and *Quartan* type. Of these the tertian is the most common in this country, and the quotidian in India. When the paroxysm occurs every day, it is called quotidian ague; when every other day, tertian, though secundan would be more appropriate; and when it is absent for two whole days, and then recurs, quartan. In the first species, the interval is twenty-four hours; in the second, forty-eight; in the third, seventy-two. The time between the commencement of one paroxysm and the beginning of the next is termed the *interval;* while that between the termination of one paroxysm and the commencement of the next—the period of apyrexia—is called the *intermission.* In quotidians the paroxysm occurs, for the most part, in the morning; in tertians, at noon; in quartans, during the afternoon. The first variety is most common in the spring; the second, in the spring and autumn; the third, in the autumn. Quotidian and tertian agues are much more frequent than quartan.

Irregular types of intermittent fever are sometimes observed; such as the double quotidian, in which there are two paroxysms daily, the double tertian, double quartan, &c. In the regular forms the paroxysm usually occurs at about the same hour of the day; though, as the poison gets eliminated or neutralized, the time is postponed for two or three hours prior to the final cessation of the attack.

Causes.—The predisposing causes of ague are fatigue, travelling, restlessness, exhaustion, mental depression, improper or insufficient food, intemperance, exposure to night air, and the circumstance of once having suffered

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* Two hundred years ago, when the soil round London was neither drained nor embanked, and when the marshes of Cambridgeshire and Lincolnshire were covered, during many months of every year, by immense clouds of cranes (Macaulay), ague was a very fatal disease in England. The tertian form was the cause of death to [illegible] in March, 1625. When told by his courtiers that "an ague in March is physic for a king," James answered that the proverb only applied to a [illegible]. Oliver Cromwell died from ague at Somerset House, in 1658, after dismissing his physicians. "I tell you," he cried, with characteristic [illegible] I tell you I shall not die of this distemper: I am well assured it is promised by the Lord, not only to my supplications, but that I shall have a stricter commerce and more intimate correspondence with him in your profession: but nature can do more than [illegible] in the world, and God is far above nature" (Hume.) The [illegible] by Robinson Crusoe of his attack of ague has excited [illegible] narrowly watched this disease, even if he had no ex[illegible]. The latter supposition is not improbable; for the [illegible] to a large extent when he retired to this country, in August, [illegible] Newgate. Robinson Crusoe was not published until

from it. It is worth remembering that malarious districts are most dangerous at night, and that this poison lies low; or, as Sir Thomas Watson says, "loves the ground." Dr. Macculloch observes that it is a common remark in many parts of Italy, that as long as the laborers are in the erect posture, they incur little danger; but that the fever attacks those who sit or lie on the ground.*

The exciting cause consists of certain emanations or invisible effluvia from the surface of the earth, known as malaria. These effluvia or miasms emanate chiefly from marshy lands; but their nature is still a mystery, for though chemists have analyzed the air of malarious districts they have not been able to detect any peculiar poisonous principle. As cultivation of the soil and drainage are carried out, so malarious diseases disappear. The general belief, that malaria is produced by decomposing animal, and particularly, vegetable matter, is probably true; the air being more noxious where both matters are undergoing decay than where vegetable matter alone is doing so. At all events, it is found in the tropics that malarious diseases are most common in the season succeeding the cessation of the rains, when the temperature is high; and in parts where the surrounding country abounds in dense jungle and low swamps, and where insects and reptiles are abundant.

Poisoning by malaria is most apt to occur between sunset and sunrise. The young, unhealthy, overfatigued, and such individuals as are exhausted from want of food or sleep, are the most susceptible. The form of disease which arises from exposure to malaria varies according to the constitutional predisposition of the individual; that which will produce ague in one person, perhaps giving rise to remittent fever or to dysentery in another. Moreover, if the poison be insufficient to excite any of the recognized forms of miasmatic disease, it can yet impress a paroxysmal type upon any intercurrent disorder; or it may simply lower the general health, causing anæmia and weakness and sallowness of the complexion—a condition known as the malarial cachexia. So, again, when the poison has been imbibed, it may remain latent in the system for from six to twenty days, and possibly even for a few months; a point necessary to remember in the diagnosis of obscure cases where the ague fit is not well developed.

Symptoms.—The disease either sets in suddenly, or the symptoms will come on gradually with a feeling of general indisposition, which at the end of a few days culminates in a regular paroxysm. An ague-fit is composed of three stages,—the cold, hot, and sweating. The *cold* stage is ushered in with feelings of languor and chilliness; though the heat of the body, as ascertained by a thermometer in the axilla, is really increased, and gradually rises through this and the succeeding period. Then sensations as of streams of cold water running down the back are complained of, together with shivering; the skin is shrivelled and the papillæ rendered prominent (gooseskin or cutis anserina) from the contraction of microscopical muscles called the arrectores pilorum; while the teeth chatter, the nails turn blue, and the whole faame is shaken. All this time the temperature is at least 101° or 102° Fahr., and perhaps 105° or 106°. There is exhaustion; often urgent thirst; the countenance appears anxious, the features shrunk and pale, and the eyes dull and hollow; the pulse is quickened; the respiration hurried and oppressed; and there is a peculiar mental irritability. The duration of this stage varies from half an hour to three or four hours; and is gradually succeeded by the *hot* stage, which is one of reaction. The surface of the body then becomes dry and intensely hot; the temperature

* An Essay on Malaria, &c., p. 268. London, 1827.

being raised considerably above the natural standard (up to 107°) while Dr. Mackintosh says that he has known it to be as high as 110° even with patients in Great Britain. The mouth is parched, and there is excessive thirst; a frequent bounding pulse, with a painful sense of fulness in the head; and great restlessness, general uneasiness, with sometimes delirium. This condition continues rarely less than three or more than twelve hours, and then follows the *sweating* stage; commencing with a gentle moisture, which appears first on the forehead and breast, increases, and gradually extends over the whole body. The pulse and breathing now become natural; the temperature of the body falls to the normal standard; the headache, heat of skin, and thirst abate; and all the distressing symptoms are relieved, so that the patient, if the case be recent, often thinks himself restored to perfect health. Occasionally, however, and especially in tropical climates, this stage ends in great exhaustion; so that the free use of some alcoholic stimulant is required to prevent fatal collapse.

The water, urea, uric acid, and chloride of sodium of the urine are all suddenly increased during the cold and hot stages; the quantity of each of these constituents diminishing as the sweating sets in. The urine occasionally contains albumen and renal casts during the fit.

Effects.—Disease of the *spleen* is a very frequent concomitant or result of intermittent fever. This gland is found enlarged, sometimes to a great extent, and occasionally indurated, in which condition it is popularly spoken of as *ague cake*. Some authors say that the spleen may be found invariably to enlarge during the cold stage, owing to the blood being driven from the surface of the body to the viscera, but especially to this organ. The enlargement subsides during the intermission, but not completely; so that after each attack the size of the gland is a little greater than it was previously. In like manner morbid changes occur in the *liver;* giving rise to depraved secretions and disturbance of all the digestive organs, and in a few cases to persistent enlargement and induration. The *kidney* is sometimes permanently affected in consequence of ague; chronic Bright's disease resulting. Intermittent hæmaturia may occur many months after exposure to the influence of malaria, and prove obstinate.

In protracted cases *complications* are not unlikely to arise; and the brain, or the lungs, or the stomach and bowels, occasionally become the seats of inflammatory action. Death from uncomplicated ague is probably never seen in this country.

Treatment.—When the patient is obliged to remain in a malarious district, the difficulty of curing ague will be very much increased. The diet should be good and nourishing, with a regulated supply of stimulants from the first, unless there is evident derangement of the alvine secretions, and then we had better commence with beef tea, milk, arrowroot, &c. In the cold stage, warm diluent drinks, such as barley-water, weak tea, or weak negus, or white wine whey, may be freely allowed; while the application of external warmth is to be assiduously employed, by means of thick clothing, hot bottles to the feet, and hot water or hot air baths. The latter can be easily prepared by means of a long wicker-work cradle, closed at one end with a board. This is laid over the patient and covered with blankets; a curved tin tube is then passed through a hole in the centre of the board, the other end of the tube expanded, into a bell-shape, looking downwards, and having the flame of a spirit-lamp placed beneath it, so that the air under the wicker-work soon becomes very hot. An opiate given a little before the cold stage is often beneficial. During the hot stage an opposite plan should be pursued; ice and cooling drinks being then required, while the surface of the body is to be sponged with tepid or cold water. When

the hot has subsided into the sweating stage, the action of the skin ought to be encouraged by tepid drinks.

A dose of some rather active purgative can often be advantageously given at the outset; none being better than four or six grains of calomel with the same of rhubarb, followed by a draught of the compound mixture of senna. The bowels having been emptied, the use of one of the two specific remedies for ague—bark or arsenic—may be commenced. The best plan, as a rule, is to give from three to five grains of the sulphate of quinine dissolved in the acid infusion of roses, every four or six or eight hours, during the intermission, taking care to continue its use in lessened doses, for some short time after an apparent cure has been effected. The subcutaneous injection of this salt (F. 379) has been recommended; and it is said that four grains so employed are equal in power to four times the quantity taken by the mouth. In Indian intermittents, the exhibition, during the sweating stage, of quinine in a dose of twenty or thirty grains, instead of smaller portions frequently repeated, has been strongly advocated. These quantities are generally well borne unless there is extraordinary exhaustion, when they might be dangerous; cinchonism (as indicated by tinnitus aurium and headache) being less readily produced in ague than in other affections. According to Ranke, quinine diminishes the quantity of uric acid in the urine.

If it be desirable, on account of its cheapness, to employ arsenic, it must be remembered that large doses will be needed (F. 52). Dr. Morehead calculates that half a grain of arsenic acid—one drachm of the liquor arsenicalis—is equivalent in power to fifteen grains of quinine; but as such a dose of arsenic can hardly be given without some risk, he has suggested that it is better to prevent the expected fit by quinine, and then trust to moderate doses of arsenic to complete the cure. The combination of quinine and arsenic in moderate doses can be strongly recommended, especially when the symptoms become chronic. The salt of the willow bark (salicin) has been recommended as a substitute for quinine; but it is by no means as efficacious. In cases of enlargement of the spleen, great benefit will be derived from a combination of quinine and sulphate of iron perseveringly used (F. 380); or perhaps from the bromide of potassium (F. 42). Cod-liver oil may also be recommended. Inunction over the splenic region with the ointment of red iodide of mercury, proves very useful, especially in chronic cases.

While treating the complications we must carefully avoid depletion. Quinine is still the remedy to trust to, the dose being large in proportion to the urgency of the symptoms. In tropical countries it sometimes happens that a patient is not seen until he is delirious or comatose; but even then a dose of twenty or thirty grains of quinine will probably restore consciousness and health. If troublesome vomiting prevent the retention of the remedies, a large blister should be applied over the stomach; while an enema of quinine and infusion of coffee is to be administered. In all cases, when the disease threatens to become chronic, change of climate is an absolute necessity. A sea-voyage does great good.

For temporary residents in malarious districts it will be found that a nutritious diet, warm and dry clothing, with a due amount of repose, are valuable prophylactics. Still it may be as well, in order to give complete immunity, to administer from two to six grains of quinine daily to each individual exposed to the unhealthy influence of the soil. Soldiers and sailors, &c., will take this drug willingly if it be mixed with orange wine, or with spirit and water.

Brass-Founders' Ague.—A peculiar form of intermittent fever, which affects brass-founders and other workmen exposed to the fumes of deflagrating zinc, has been noticed by Mr. Thackrah and more fully described by Dr. Greenhow. All that Mr. Thackrah says is this: "The brass-melters of Birmingham state their liability also to an intermittent fever, which they term the brass-ague, and which attacks them from once a month to once a year, and leaves them in a state of great debility. As a preventive, they are in the habit of taking emetics. They are often intemperate."* Dr. Greenhow's observations show that the symptoms have some resemblance to an imperfect fit of ague; but the paroxysms occur irregularly. The attack commences with malaise, and a feeling of constriction or tightness of chest, occasionally accompanied by nausea. These phenomena always happen during the after-part of a day spent in the casting-shop; and are followed in the evening or at bedtime by shivering, sometimes succeeded by an indistinct hot stage, but always by profuse sweating. The sooner the latter follows the setting in of the cold stage, the shorter and milder is the attack and the less likely is the caster to be incapacitated for work on the following day. Headache and vomiting frequently accompany the paroxysm, which at the worst is only ephemeral; but the attacks are sometimes of frequent occurrence. Persons who have but lately adopted the calling, or who only work at it occasionally, and regular brass-founders who have been absent from work for a few days, are more liable to suffer from this disease than those who are employed at it continually. The men themselves attribute it to inhaling the fumes of deflagrating zinc or "spelter," and their opinion is probably correct. For, on the one hand, several other classes of operatives are habitually exposed while at work to conditions exactly similar to those of the brass-founders, except the liability to inhale the fumes of zinc, and yet do not suffer from this ailment; and, on the other hand, brass-founders suffer from it in almost exact proportion to their liability to inhale these fumes. A belief prevails that milk has a strong prophylactic and curative influence, and hence many of the workmen habitually drink it. The occasional use of emetics has a tendency to prevent the disease.†

III. REMITTENT FEVER.

This disease may be described as a non-infectious fever, attended with distinct exacerbations and remissions [*Remitto* = to remit, or abate]. It presents a cold, a hot, and a sweating stage; the hot being more marked than either of the others.

Causes.—The causes of remittent fever are the same as those of the disease described just previously, and hence we might appropriately speak of it under the designation of *miasmatic* or *malarial remittent fever*. The symptoms also bear a resemblance to those of intermittent fever; with this notable difference, however, that in the intervals there is no complete apyrexial period—no cessation of the fever, but simply an abatement or diminution. The period of remission varies from six to twelve or fourteen

* The Effects of Arts, Trades, and Professions, and of Civic States and Habits of Living, on Health and Longevity. Second Edition, p. 101. London, 1832.

† "On Brass-Founders' Ague." Transactions of the Royal Medical and Chirurgical Society, vol. xlv, p. 177. London, 1862.

hours; at the end of which time the feverish excitement increases, the exacerbation being often preceded by chilliness and rigors.

This form of fever will be found to vary much in severity, according to the nature of the climate in which the poison is generated. The autumnal remittents of countries like England and France are comparatively mild; whereas the endemic remittents of tropical climates are often very severe and fatal. Moreover, the locality where the fever prevails seems often to impress some peculiarity upon it, especially as regards the nature of the complications which arise; and hence we find remittent fever described under the names of the *Walcheren fever*, the *Mediterranean fever*, the *Jungle* or *Hill fever* of the East Indies, *Bengal fever*, the *Bilious remittent* of the West Indies, *Sierra Leone fever*, *African fever*, &c.

Symptoms.—The paroxysm of remittent fever commences usually with chilliness, a sense of oppression about the epigastrium, lassitude, mental depression, a feeling of cold down the back, and headache. To these sensations soon succeed febrile symptoms, constituting the hot stage. The prominent phenomena then consist of flushing of the face with great heat of skin, a temperature of 105° being often attained; severe headache and giddiness, often accompanied by mental confusion or even delirium; a frequent (perhaps 120) and full pulse; a dry and furred tongue; nausea and vomiting—generally of bilious matter; a sense of pain at the epigastrium, and tenderness on pressure; with signs of pulmonary congestion such as dyspnœa, a feeling of oppression at the chest, cough, and a livid color of the countenance. The urine is often scanty, high-colored, and loaded with urates; but it is passed in increased quantities during the remissions. There is very seldom any albumen present.

The remissions usually occur in the morning, and have a duration ordinarily of eight or twelve hours. The principal exacerbation generally takes place towards the evening, and continues for the greater part of the night; though sometimes the paroxysm lasts for twenty-four, or even thirty-six hours. The disease will run on for about seven, or fourteen, or twenty-one days, unless shortened by proper treatment. It may terminate rather abruptly in an attack of sweating; or its symptoms will occasionally merge into those of low fever. The period of convalescence is usually short, except some organic mischief has occurred. In the latter case, considerable time may elapse before a restoration to health is effected; the debility being kept up by night sweats, sleeplessness, dyspepsia, hypochondriasis, neuralgia, jaundice, and even dropsy.

In tropical climates remittent fever proves more dangerous than in milder latitudes. This arises either from the general severity of the symptoms and the high degree of febrile reaction; or because there is a depressed condition of the vascular and nervous systems, with defective secretions; or it is owing to the sudden setting in of great exhaustion towards the close of an exacerbation, which exhaustion has a great tendency to end in fatal collapse; or, lastly, the increased danger is in consequence of the disease being complicated with convulsions, or with delirium passing into drowsiness and coma, or with great gastric irritability, or with bronchitis and pneumonia, or with hepatitis and jaundice.

Treatment.—The principal indications to be followed ought to be the same as are demanded in the treatment of ague, if the supposition that both are due to malaria be correct. At the same time it is to be remembered that, as the febrile exacerbation is of much longer duration in remittent than in intermittent fever, so there is a greater fear in the first of internal organs being damaged, and ultimately of more severe depression ensuing. Our object will therefore be to shorten the period of the exacer-

bation, and lengthen that of the remission. This we attempt to do by saline and effervescing draughts (F. 348, 349, 355); cold drinks, such as iced water, lemonade, cold tea, cream of tartar, &c. (F. 356, 360); an aperient (F. 139, 144, 165, 169), if the bowels are confined; an emetic of ipecacuanha (one scruple of the powder, or an ounce of the wine), if there be nausea without vomiting, which is seldom the case; and frequent tepid sponging (F. 138) of the whole surface of the body. Immediately remission takes place, a dose of quinine, varying from two to six grains, should be exhibited, and repeated every third or fourth hour; taking care to omit this remedy directly the hot stage again sets in. At the next remission we once more resort to the bark, and so on until it seems certain that the febrile phenomena have permanently disappeared. Where the bowels are sluggish, one or two of the doses of quinine can be combined with either a drachm of the wine of aloes, or with one hundred and twenty grains of sulphate of magnesia; or, in the event of the stomach being irritable, with an effervescing draught; or, if there be diarrhœa or restlessness, with half a grain of morphia.

In tropical climates the complications of remittent fever must be treated very cautiously. Where there is much cerebral derangement, an active purgative, with the constant application of cold to the head, or the occasional use of cold affusion, may prove very beneficial, in addition to the remedies already mentioned; while if there be great drowsiness during the remission, a blister should be applied to the nape of the neck. On the contrary, the low delirium with drowsiness from exhaustion demands the free use of stimulants and nourishment. When the stomach is irritable, or when there is jaundice, the application of sinapisms, or iodine liniment, or turpentine stupes, or of a blister to the epigastrium, will give relief; while we may allow ice to be freely taken. If there be congestion of any internal organs, the wet sheet-packing (F. 136) proves one of the best remedies by producing free action of the skin. In all cases quinine is to be given during the intermissions. Bleeding has been recommended by some authorities where there are symptoms of cerebral or abdominal oppression; but although the views as to its value are very contradictory, yet depletion would seem only to give temporary relief, while subsequently it produces alarming depression. And lastly, supposing there seems reason to fear the occurrence of any permanent structural disease, the patient must be sent to a temperate region free from malaria.

IV. YELLOW FEVER.

This remarkable disease may be described as an acute malignant epidemic fever. That it is infectious seems now to be generally admitted. As a rule, one attack gives exemption from a subsequent seizure. Ushered in with chilliness and languor, its prominent characters are, pain about the loins and severe headache, a greenish-yellow hue of the skin, more or less delirium, sometimes watchfulness, sometimes a tendency to stupor, a liability to suppression of urine, uneasiness about the epigastrium, and black vomit. From this latter symptom the term *hæmogastric* fever has been applied [$Αἷμα$ = blood + $γαστήρ$ = the stomach]. There are exacerbations and remissions, but they are so connected that the disease resembles a continued fever

Yellow fever is a disease of warm climates; an average temperature for some weeks of at least 72° Fahr. being necessary for its production. The specific poison of this disease is said to be destroyed by a temperature of 32° Fahr. on the one hand, or of 212° on the other; though neither temperature has any effect in arresting the fever in the system. Yellow fever is not of infrequent occurrence in cities on the borders of low marshy plains; while it may be said to be habitually present in the seaport towns of the West India Islands, in Africa, the southern parts of Spain, and some parts of the coasts of North and South America. It has been described under the various names of *Bulam fever, mal de Siam, typhus icterodes, febris flava, black vomit,* &c. Like all other fevers, it occurs in different degrees of severity. At one time it attacks only a few individuals sporadically, at another period it prevails epidemically; its outbreaks are generally preceded by some unusual meteorological conditions, and while it may cause the greatest devastation in low grounds, the inhabitants of elevated regions enjoy almost complete immunity from its effects. I believe it is correct to say that yellow fever has only once or twice occurred at a greater elevation than 2500 feet above the level of the sea.

Symptoms.—An attack of this fever often sets in abruptly, perhaps in the middle of the night. Occasionally, for two or three days before the seizure, there is languor, loss of appetite, giddiness, frontal headache, and mental depression. Sometimes the disease commences with coldness of the surface, or even distinct rigors, followed by fever which lasts for several hours. In another class of cases, there is prostration from the first, without febrile reaction; stupor, coma, and convulsions soon following.

Where there is decided fever, it generally becomes aggravated towards night; the temperature of the skin sometimes rising as high as 105° or even to 107° Fahr. The pulse moreover gets frequent, the mouth parched and dry, the eyes congested and painful, and the face flushed. Distressing headache, perhaps confined to one temple, is very common. There are pains in the back and limbs, as well as in the large joints. Irritability of the stomach is usually present; together with tenderness on pressure, a sense of tightness about the præcordia, and nausea, which is followed after a few hours by constant vomiting and retching. There is thirst, with a desire for cold drinks. The urine is diminished in quantity, and of a dark-red color; it is usually albuminous. Generally there is constipation, or if any stools be passed they are found free from bile. Distressing restlessness, mental anxiety, sleeplessness, and perhaps active delirium tend to show the force of the disease.

At the end of the second or third day, the severity of the symptoms greatly diminishes. The patient feels much relieved, while the face gets slightly jaundiced, the skin becomes moist, and there are copious bilious stools. In favorable cases, convalescence is firmly established. More frequently the improvement is of short duration. After some twenty-four hours, the epigastric tenderness is aggravated, the jaundice increasing and spreading over the body. There is a tendency to stupor; the pulse becomes feeble, irregular, and slow—perhaps as low as thirty beats in the minute; the tongue gets foul and dry; the respiration is embarrased, and hiccup, thirst, nausea, and vomiting, &c., are constant. Unless the symptoms remit, grumous blood is vomited—black vomit. The urine is suppressed or simply retained; the skin becomes of a dark-brown hue; dark-colored blood is effused in patches under the skin, or exudes from the nose, gums, tongue, stomach, anus, vagina, &c., and most offensive tarry-looking stools are passed. There are now all the features of a most malignant fever: an almost imperceptible pulse; slow or stertorous breathing; involuntary

evacuations; difficulty of deglutition and articulation; suppressed or bloody urine; with formation of buboes or patches of gangrene. Death takes place, preceded by coma or convulsions, or the patient retains consciousness to the close.

Two or three of the foregoing symptoms may be deemed of particular importance. Thus, the appearances presented by the tongue at different stages are very variable; this organ being usually furred, sometimes flabby and white and indented by the teeth, at other times dry and brown. The matters vomited are at first white, slimy, and tasteless, but soon they assume the appearance of coffee-grounds, owing to blood being effused into the stomach, where it is acted upon by the acid contents of this viscus. This altered blood is the essential element of the so-called black vomit. Then, the dejections likewise have a tarry appearance, from admixture with blood. There is frequently more or less complete suppression of urine, or this secretion may be smoky-looking, and loaded with albumen and casts of tubes. A copious and natural renal secretion is a most favorable sign. The fever in women always causes the catamenia to appear—or at all events produces uterine and vaginal hemorrhage, even if the normal menstrual period has only just ceased.

Prognosis.—The usual duration of the fever is from three to seven or even nine days; though in some severe cases the patient is at once "knocked down" by the poison, and dies in a state of collapse at the end of a few hours. When the sixth day elapses without the occurrence of black vomit or suppression of urine, there is great hope of recovery; but if all other symptoms are absent, and only one of these present, our prognosis must be very unfavorable. The occurrence of black watery and shreddy stools is also indicative of great danger, and so is severe lumbar pain. If the pupils be widely dilated, cerebral complications are to be feared. The mortality seems to be at least 1 in 3. At Lisbon, in 1857, the fatal cases in the unhealthy quarters of the city were nearly forty-three per cent. But occasionally epidemics of a much milder character have occurred in the West Indies and America. Death usually occurs from exhaustion, or uræmic poisoning, or apoplexy.

Morbid Anatomy.—The special poison of yellow fever appears particularly to affect the *liver;* and Professor A. Clarke, of New York, has suggested that the change so constantly observed in this organ, in fatal cases, is an acute fatty degeneration. Dr. La Roche confirms this opinion, for he says that in all the examinations made during the epidemic of 1853 at the Pennsylvania Hospital, this change in the liver was discovered.*

Various changes have been found in the *blood.* The most frequent are, a yellowness of the serum, an appreciable unpleasant odor, an acid reaction, a deficiency of fibrin, an excess of urea, and a disintegration of the red corpuscles. The *kidneys* are usually congested; a minute examination showing the tubes choked with fibrinous casts, fat-cells, and corpuscles. The *tissues of the body* generally, and those of the *heart* to perhaps a marked extent, are pale and flabby and abnormally friable. Lastly, the *stomach* and *intestines* usually contain black vomit, while the mucous membrane is sometimes here and there detached from the subjacent tissues.

Treatment.—The indications presented by the fever are to be observed. The disease cannot be cured, but the patient may be guided through it. Hence, it will be better to follow Dr. La Roche's advice, and treat the urgent symptoms as they happen, leaving the rest to the reparative powers

* Yellow Fever, considered in its Historical, Pathological, Etiological, and Therapeutical Relations, vol. i, p. 404. Philadelphia, 1855.

of the system. Removal from the infected locality is not only a valuable prophylactic measure, but where it can be had recourse to in affected cases, the change is often followed by marked amelioration of the symptoms. Nothing so soon and so thoroughly arrests yellow fever on board ship as running into a cold latitude. Where this cannot be done, the greatest attention should be paid to cleanliness, both by the free use of disinfectants and by pumping out foul bilge-water, &c.

From the commencement of the disease until convalescence is firmly established, the patient had better strictly maintain the recumbent posture. His bed ought to be placed in the centre of a well-ventilated room. The diet must be very simple, consisting of barley-water, arrowroot, milk and lime-water, cold tea, ice and iced water, lemonade, broth, beef tea, &c. Purgatives are at first almost universally employed; podophyllum, calomel, and sulphate of magnesia with jalap or senna being the favorite drugs of this class. Sometimes they are combined with large doses of quinine. Bark or quinine can also be administered after the bowels have acted; or the tincture of perchloride of iron with a mineral acid may be tried, or the nitro-hydrochloric acid well diluted. A few drops of chloroform can be given four or five times in the twenty-four hours, if there is pain, or restlessness, or severe vomiting; or, in extreme cases of suffering, about one-fourth of a grain of morphia with the same quantity of extract of belladonna may be prescribed, provided the urine be copious and free from albumen. Turpentine, owing to its action on the skin and kidneys, is thought useful by many observers; if tried, it should be administered in small doses—min. 20 to 60, frequently repeated—almost from the commencement of the attack. It seems to me highly probable, however, that some preparation of oxygen (F. 370) will prove more serviceable. The prolonged use of the warm bath, or wrapping the patient in the wet sheet, may occasionally be advisable. Blisters or sinapisms to the nucha, calves of the legs, &c., are recommended to relieve headache and pain, as well as to stimulate the system in cases of collapse. Cold applications to the head are useful. M. Guyon states that the intense cephalalgia may be relieved by compressing the temporal arteries, which can be done effectually with a semicircular curved band of steel, having a pad at each end like that of a common truss.

A word or two of caution is necessary as to the selection of stimulants. And, in the first place, we should carefully avoid giving ammonia, for Dr. Blair particularly notices the ammoniacal state of the blood, breath, and vomited matters. In some cases this observer says that the blood was found as fluid as port wine, the corpuscles being all dissolved, while it was strongly ammoniacal. Secondly, of all alcoholic stimulants champagne or sparkling moselle will be found the most grateful. Any kind of wine or spirit, however, may prove very injurious where the action of the kidneys is embarrassed. The congestion of these organs will be increased; death probably following from suppression of urine, though the patient be drenched with brandy.

About the year 1448, when Venice was the great emporium of Eastern trade, quarantine regulations appear to have been first promulgated. Since then, they have prevailed in most countries. At the present day, able men have advocated their abolition on the grounds, that while they are injurious to commerce and very vexatious to travellers, they do not prevent the spread of epidemic disease. For it has been shown that yellow fever is local or endemic in its origin, while there is no evidence that it has been imported, save in one or two exceptional instances. In fact many epidemics have been stayed by removing the sick from the infected locality,

and dispersing them through healthy districts. One circumstance has ever, been pointed out, that "beside the common external localizing c there is one constitutional predisposing cause of paramount impor namely, non-acclimatization—that is, the state of the system produc residence in a cold climate; in other words, European blood exposed action of tropical heat; the practical lesson being that the utmost should be taken to prevent individuals or bodies of men, recently ar within the yellow fever zone, from going into a district in which th ease actually exists or has recently been present."* It may be hoped, all the foregoing, that the day is not very distant when sanitary work be substituted for quarantine restrictions.

V. ERUPTIVE FEVERS.

The eruptive fevers may be regarded as continued fevers, havin eruption superadded. The chief are—*small-pox, cow-pox, chicke measles,* and *scarlet fever;* to which it is convenient to add *dengue, sipelas,* and *plague.*

The principal diseases of this class have these common character variable amount of time elapses between the reception of the poison the setting in of the symptoms, called the period of incubation. The preceded by rigors, and are accompanied by a fever which runs a de course. They are attended by an eruption, which goes through a re series of changes. They for the most part affect every individual onc once only, during life. Lastly, they arise from a specific contagious p Of all the eruptive fevers scarlatina is probably that which most frequ affects the system a second time.

The mortality from these fevers in England, in different years, v considerably. To exhibit the contrast, as well as to show how each y distinguished by the occurrence of some one or two master epidemics deaths from eight of the principal zymotic [*Ζυμόω* = to ferment] dis may be thus arranged:

	1860.	1861.	1862.	1863.	1864.	1865.	186
The Estimated Population,	19,902,713	20,119,314	20,336,467	20,554,137	20,772,308	20,990,946	21,21
Deaths from all Causes,	422,721	435,114	436,566	473,837	495,531	490,909	50
Measles,	9,557	9,055	9,890	11,349	8,323	8,562	1
Scarlet Fever,	9,681	9,077	14,834	30,475	29,700	17,700	1
Small-pox,	2,749	1,320	1,628	5,964	7,684	6,411	
Continued Fever,	13,012	15,440	18,721	18,017	20,106	23,034	2
Diphtheria,	5,212	4,517	4,903	6,507	5,464	4,145	
Hooping-cough,	8,555	12,309	12,272	11,275	8,570	8,647	1
Croup,	4,380	4,397	5,667	6,957	6,777	5,921	
Erysipelas,	1,665	1,542	1,523	1,920	2,104	1,963	

The following table shows the period of incubation, together wit date of eruption and time of its disappearance, in the four chief eru fevers:

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* Second Report on Quarantine. General Board of Health, p. 185. London

Disease.	Period of Incubation.	Eruption appears.	Eruption fades.
Measles, . . .	10 to 14 days.	On 4th day of fever, after 72 hours' illness.	On 7th day of fever.
Scarlet Fever, .	4 to 6 days.	On 2d day of fever, after 24 hours' illness.	On 5th day of fever.
Small-pox, . .	12 days.	On 3d day of fever, after 48 hours' illness.	Scabs form on 9th or 10th day of fever, and fall off about the 14th.
Chicken-pox, .	4 days.	On 2d day of fever, or after 24 hours' illness.	Slight scabs form about 4th day of fever.

There is some doubt whether the features of a disease should be sketched, which presents many of the characters of measles and scarlet fever conjoined; and which has been described as *rubeola*, or *rubeola notha*, or *rötheln*, or *scarlatina morbillosa*, or a *hybrid of measles and scarlet fever*. I think, however, any special description unnecessary, because we all know that measles and scarlatina may exist in the body at the same time; and hence the affection is merely a compound of the two. There will be found the eruption and coryza of measles, with the inflammation of the fauces and submaxillary glands of scarlatina. As these inflammatory symptoms are usually the most urgent, this hybrid disease should be regarded with caution, so far as the prognosis is concerned; while it must be treated according to the rules laid down in the section on Scarlet Fever. Care is particularly to be taken to maintain the functions of the skin. It may also be remembered that the use of colchicum has been strongly recommended. That rubeola is due to a specific poison, like each of the other eruptive fevers, has been suggested; but I am not aware that this opinion has been substantiated.

Further, it is necessary to mention that measles may coexist with small-pox, or hooping-cough, or chicken-pox, &c., as Mr. Marson has well shown.*

1. **SMALL-POX.**—Variola, or small-pox, is certainly the most remarkable of the eruptive fevers. It is due to the reception into the blood of a specific poison, which begins to give indications of its power about twelve days after absorption. In its entire course each case of variola [from *Varius* =spotted] goes through four stages—that of incubation, of primary fever, of eruption, and of secondary fever.

Small-pox may be defined as a continued and infectious and eruptive fever. The period of latency or incubation lasts twelve days, during which there are no symptoms of indisposition. Then the disease commences with shivering, fever, headache, vomiting, and well-marked muscular pains in the back. These symptoms are succeeded at the end of forty-eight hours, or the beginning of the third day, by an eruption of small red pimples; which in the course of a week inflame and suppurate and begin to scab. In many instances the disorder is accompanied by a similar affection of the mucous membrane of the nose and mouth and throat; in some, by swelling and inflammation of the subjacent connective tissue; and occasionally by

* Medico-Chirurgical Transactions, vol. xxx, p. 129. London, 1847.

marked irritation of the nervous system. With extreme rarity a few pustules are found on the ocular conjunctivæ, or on the margins of the eyelids. Pregnant women abort; or they are prematurely delivered, the fœtus more frequently being dead than not: the mother often does well. When the vomiting and pain of the back are violent, they are generally the precursors of a severe form of the disease.

The peculiar eruption of pimples or papulæ always begins to show itself on the commencement of the third day of the fever. It appears in the following order—first, on the face, the neck, and wrists; secondly, on the trunk; and lastly, on the lower extremities. The papulæ then gradually ripen into vesicles, and then into pustules; the suppuration being complete by the ninth day. About this time the pustules break, and crusts or scabs form. In four or five days more these scabs are falling off.

Now the severity of the disease almost always bears a direct relation to the quantity of the eruption. Where the pustules are few, they remain distinct and separate from each other; when very numerous, they run together, coalesce, and lose their regularly circumscribed circular form. We thus have a division of small-pox into two varieties,—variola *discreta*, and variola *confluens*. The former is seldom attended with danger; the latter is never free from it. The eruption on the face may be of the confluent form, while it is scanty elsewhere; still the disease is of the confluent kind. Sometimes the pustules are so numerous that they touch each other, but nevertheless do not actually coalesce. The disease has then been said to be of the *cohering* or *semi-confluent* form.

In *variola discreta*, the eruption, in the words of Willan, is papular. On the third day a small vesicle, with a central depression, appears on each papula, containing some thin transparent lymph; around this an inflamed areola forms. About the fifth day of the eruption, or the eighth of the disease, the vesicles lose their central depression: they become turgid, and hemispheroidal. Suppuration has occurred, and the vesicles have become pustules containing yellowish matter. A peculiar disagreeable odor now begins to emanate from the patient, which once smelt cannot be forgotten, so that from it alone the disease might be diagnosed. About the eighth or ninth day a dark spot appears on the top of each pustule, the cuticle bursts, the matter oozes out, and the pustule dries into a scab. At the end of some ten days more the crusts fall off, leaving a purplish-red stain, which slowly fades; or where the pustule has gone so deep as to destroy a portion of the true skin, there will be found to result that permanent disfigurement,—the so-called pitting or pock-mark.

Variola confluens is usually ushered in by more distinct rigors and more violent fever than is the distinct variety. The eruption comes out earlier. The eyelids get tumid, so that by the fifth day the patient is often unable to see; the tonsils and parotid glands become affected; there is salivation also, or in children a vicarious diarrhœa with possibly convulsions; and the limbs swell. The urine is diminished in quantity, while the urea and uric acid are increased; and sometimes there is albumen for a few days, or even blood with renal casts. The vesicles on the face run together into one bleb, containing a thin brownish ichor; while the face also becomes pale and doughy. The vesicles on the trunk and extremities, though often not confluent, have no areola and are pale. On the breaking of the pustules, large brown or black scabs are formed, exhaling great fetor; while the pulse gets rapid, great debility sets in, and there is much restlessness. The mucous membranes become involved; those of the nose, mouth, larynx, and trachea being the seat of an eruption. The tongue and palate become with small vesicles; the throat is very sore; there is difficulty of

allowing, with hoarseness and dyspnœa, and cough; while the glottis ten becomes narrowed, and suffocation perhaps ensues. Delirium frequently occurs. When to the foregoing symptoms malignancy and putrescency are added, the disease becomes *malignant* small-pox; a form which sed to be described as the Black pock.

The greatest difference, however, between the distinct and confluent forms of the disease is in the *secondary fever;* which, slightly marked in the first, is intense and perilous in the second. It sets in usually about the eleventh day of the disease, or the eighth of the eruption, and occasionally at once proves fatal; the system appearing to be overwhelmed by the virulence of the seizure. During its course, various troublesome complications may arise; such as erysipelas, swelling of the glands in the groin and axilla, abscesses, pyæmia, gangrene, phlebitis, pneumonia, pleurisy, bronchitis, dysentery or diarrhœa, conjunctivitis, ulceration through the cornea, suppuration of the ear, &c. Hence if the patient escape with his life, he may find himself permanently afflicted with blindness, deafness, or lameness.

When small-pox occurs after efficient vaccination, or after a previous attack of variola, the affection is spoken of as *modified* small-pox. *Varioloid*, or *abortive* small-pox, is that form in which the eruption seems to stop in its vesicular stage; most of the vesicles drying up, instead of going on to the formation of pustules.

There is no contagion so powerful or so certain as that of small-pox. Clothes, bedding, &c., used by patients in this disease, retain the power of infection for a long time unless they are thoroughly purified. One attack of this affection exhausts the susceptibility of the system to the future influence of the poison, as a general rule. This law is subject to very few exceptions, many of the recorded cases of recurrent small-pox not bearing a rigid investigation. It is sure to lead to error if the statements of patients on this head be trusted to. A great sensation was created in 1774, in France, by the death of Louis XV, from variola, at the age of 64; it being generally believed that he had gone through the disease when he was 14 years old. From a careful inquiry, however, Dr. Gregory convinced himself that his Majesty never had small-pox in early life at all, but only varicella. The Small-pox and Vaccination Hospital was founded in 1746; and Mr. Marson has informed me (June, 1864) that no instance had occurred of a patient being twice admitted, each time with variola.* Nevertheless it must not be thought that recurrent attacks never take place. I only wish to show that they are very uncommon. One gentleman, according to Dr. Gregory, said that he had met with between eighty and ninety examples in his own practice. This was clearly impossible. Even Dr. Jenner may have been mistaken in his allusion to "the lady of Mr. Gwin-

* The present building at Highgate was opened in 1850; since which time there have been four severe epidemics of small-pox in London. According to the medical report of this institution for the year 1866 it appears, that the first epidemic in 1851–2 gave to the hospital 1482 admissions; the second, that of 1854, '55, and '56, yielded 2221; the third, that of 1859–60, gave 2060; while the fourth, extending over 1863, '64, '65, and '66, contributed 5691 admissions. This last epidemic, judging from the admissions of patients into the hospital, commenced about November, 1862, and began to decline soon after June, 1863; but in the winter of 1864–5 it acquired increased violence, and in 1866 it had reached a higher degree of intensity. Of the 5691 patients brought to the institution during the epidemic of 1863–6 there were 1587 admitted in 1863; 836 in 1864; 1249 in 1865; and 2069 in 1866. Of the numbers admitted in 1866, there were 32 suffering from various forms of disease not small-pox; of the 2037 cases of small-pox 425 occurred in unvaccinated persons, and 1605 in persons who had been vaccinated. There were three cases which occurred after a previous attack of natural small-pox, two cases after inoculation, and two

[illegible] [illegible] [illegible] times.* But the most incredible case recorded is that of a sergeant of the North Gloucestershire Militia, who [illegible] he had so [illegible] that he took small-pox every time he attended a patient suffering from this disease.†

Variola occurring in persons previously protected by inoculation or vaccination is fatal in the average of one in every three; while in those attacked after efficient vaccination the mortality is very small—perhaps not as much as two or three per cent. The calculation has been made by the Registrar-General, that the average number of deaths annually from small-pox, in London, during the years 1838—1847, were 857 to every 100,000 inhabitants; whereas in 1837 they were 42 for the same proportion. When the variolous matter is first inserted into the skin by a few scratches—*inoculated small-pox*, the disease is, in all respects, of a remarkably mild nature. The practice of inoculation was introduced into this country by Lady Mary Wortley Montagu, in the [illegible]‡

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cases after vaccination and small-pox. The deaths in 1852 were 272, being in the proportion of 15 per cent. of the whole admissions. Of the 425 unvaccinated cases 152 died, being a mortality for this class of 35·7 per cent.; while of the 1605 persons who were vaccinated only 109, or 6·7 per cent., died. The average mortality in the hospital in the 15 years ending December 31st, 1851, was at the rate of 21·38 per cent. per annum of the whole admissions, but the death-rate in the unvaccinated being 35 per cent., and in the vaccinated 6·76 per cent. The ratio of vaccinated cases to the whole admissions during the same period was 53 per cent., a proportion which has gone on progressively increasing.

* The Life of Edward Jenner, M.D., &c. By John Baron, M.D., vol. ii. p. 265. London, 1838.

† Quoted from Dr. W. Aitken's Science and Practice of Medicine. Second Edition, vol. i. p. 246. London, 1853.

‡ When and where *inoculation* originated is unknown. From time immemorial, the Chinese have practised a method of "sowing or disseminating" the disease; which consists in introducing the scales of the eruption into the nostrils. At a very remote period, in Hindostan, a tribe of Brahmins resorted to it as a religious ceremony. A small incision was made, and cotton soaked in the virus applied to the wound. Offerings were devoted to the Goddess of Spots, to invoke her aid; this Divinity having first hinted at inoculation,—"the thought being much above the reach of human wisdom and foresight." But the merit of introducing the practice into this country, from Turkey, is due to Lady Mary Wortley Montagu. Writing from Adrianople, in April, 1717, she observes: "Every year thousands undergo this operation, and the French Ambassador says pleasantly, that they take the small-pox here by way of diversion, as they take the waters in other countries. There is no example of any one that has died in it, and you may believe I am very well satisfied of the safety of the experiment, since I intend to try it on my dear little son. I am patriot enough to take pains to bring this useful invention into fashion in England." (The Letters and Works of Lady Mary Wortley Montagu. Third Edition, vol. i, p. 309. London, 1861.) The debt which our ancestors owed to this lady is not diminished by the fact that inoculation had been practiced for very many years in South Wales, where it was known as "Buying the Small-Pox:" for this circumstance only became generally recognized as Lady Montagu's views engaged attention, and while she enjoyed the privilege of being the best abused person in England.

That the effects of inoculation were most remarkable, is undoubted; though even to the present day, no satisfactory explanation has been given for the mildness of the disease when thus introduced into the system. The reports of the London Small-pox Hospital for 1797, 1798, and 1799, show that among 5964 cases of inoculated small-pox, there were only 9 deaths, or 1 in 662, and this appears to have been the average mortality. There is also much evidence to lead to the belief that infection does not spread from an inoculated patient. Mr. Holwell, who inoculated multitudes in India, during a residence of thirty years, affirmed that "it never spreads the infection, as is commonly imagined in Europe." (Quoted from Dr. Chapman's Lectures on the Eruptive Fevers, Hemorrhages, and Dropsies, and on Gout and Rheumatism, p. 46. Philadelphia, 1844.)

With regard to this subject, it is most interesting to notice that a method which

The "stamping out" in this country during 1866–67, of that fatal disease to cattle, the Rinderpest, has suggested to Sir James Y. Simpson the application of the same principle to the extirpation of small-pox in 1868. As the poleaxe was the leading measure required to blot out rinderpest, so *isolation* is to be the chief means employed to stamp out small-pox. Those affected with this disease must, in fact, be placed in strict quarantine, until they have completely passed through the disorder and lost all power of communicating it to others. That this might be effected without any extraordinary inconvenience, can scarcely be doubted. Unlike the expulsion of the unclean leper from the camp under the Mosaic law, the necessary seclusion of the individual with small-pox would prove but of short duration. But it seems to me that were the proposal successfully carried out,—could we, for example, say on a certain day that there was not a single case of small-pox in Great Britain, yet our immunity would prove of short duration. Sir James Simpson mentions two cases, which show how easily the disease is spread; and though he suggests certain rules, according to which the occurrence of small-pox in any house, should be at once notified to the authorities, yet I believe that the mischief would be accomplished before isolation could be had recourse to. Several years ago a beggar woman entered the town of Leith, carrying a child who was recovering from small-pox. She went to a low quarter of the town to find lodgings and there remained. Very soon the disease spread among the inhabitants, until a great number were attacked in all parts of the town, and ninety-nine perished by it. Again, a long time since (1818–19), a girl in travelling from York to Norwich, was exposed to small-pox at a market-town, in the course of her journey. When she reached Norwich the disease appeared upon her. A druggist soon afterwards inoculated three children

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has proved of such value to mankind has been employed for the relief of a disease in the sheep, corresponding to, but not identical with human small-pox. In June, 1862, a very severe outbreak of *Variola Ovina* occurred in a farm at Allington, in Wiltshire. The epidemic spread to eight or nine other farms, and was fatal to 800 sheep. When Professor Simonds was summoned to Allington in August, after 400 cases had occurred, with nearly two hundred deaths on this farm alone, he resolved, "as the best means of saving the rest of the flock, and of putting a definite term to the outbreak," to inoculate the whole flock. This was done, and in consequence, the disease appeared in the very mildest form in the majority of the cases.

A valuable report of experiments made under the direction of the Lords of the Privy Council, as to the influence of the vaccination of sheep in preventing sheep-pox, has been prepared (June, 1864) by Mr. Marson and Professor Simonds. They state that sheep-pox is not known to have existed in England, except on three occasions—in 1710–11, 1847–50, and 1862, and that it is always the result of infection. They find that vaccination cannot be relied upon as a preventive or mitigant, as the vaccine disease in these animals is but very imperfectly developed, even in the most successful cases. But they consider that inoculation is a measure which, if rightly carried out, offers considerable advantages. It gives security against a natural attack, for as a rule, sheep-pox occurs but once. It limits the period of the existence of the disease in the flock, mitigates the severity of the malady, saves the lives of many sheep which would otherwise be sacrificed, and produces comparatively but little loss of condition. It controls the extension of the disease, as one confluent natural case does more to diffuse the poison than probably fifty ordinary inoculated cases would do. Lastly, the mortality of the inoculated disease, when compared with the natural, is on the average only as three per cent. in the one case, to fifty per cent. in the other.

The student who is desirous of investigating this subject more fully, should refer to the Address in Medicine, by Dr. Wm. Budd, in the British Medical Journal, p. 141, August 8th, 1863; to A Practical Treatise on Variola Ovina, by James B. Simonds, Lecturer on Cattle Pathology at the Royal Veterinary College. London, 1848; and to the Report of Experiments made under Direction of the Lords of the Council as to the Vaccination of Sheep, &c. London, 1864.

with variolous matter, and from these two causes a dreadful mortality was produced. About 3000 persons were attacked, and 530 died. Such histories as these could be easily multiplied. Granting, however, that it would not be impossible to draw a cordon round each patient known to have small-pox, and allowing, for the sake of argument, that we might seize and seclude every traveller arriving in this country undoubtedly affected with the disease, the question arises as to how we are to deal with those who have it, without being aware of the fact? Sir James Simpson asserts, that "the disease does not mature into the stage of infection for some days after the eruption shows itself." If this were true, we should certainly have a manifest advantage in limiting the affection. But I cannot believe in the soundness of the remark. For, according to Mr. Marson, who must be considered the highest authority on the subject now living, the disease is most likely communicable from the moment when the initiatory fever begins. It may be given by the breath of the patient before the eruption has appeared on the surface of the body. In proof of this he mentions the following singular case: A few years since a lady, while walking in Islington, met a person with small-pox. Twelve days afterwards the lady was taken ill; she was delirious for a few hours, but got well without the appearance of any eruption. A married sister who had not been outside the house for three months, because of her pregnancy, was seized with confluent small-pox twelve days after her sister's attack. My own experience on this question is also somewhat to the point. In the year 1848, I attended a poor woman in labor, who had been in a state of high fever during the preceding twenty-four hours. The infant was still-born and could not be resuscitated. On the day after her delivery, the skin of the face and arms became covered with an eruption of pimples which appeared of a dark color. There was delirium with great prostration, and death occurred in a few hours (38 hours after birth of child). Exactly twelve days after the labor, the nurse of the patient was taken ill; her disease proving to be an attack of distinct small-pox. I attended her until recovery was complete, and neither of us had any doubt but that the disease had been contracted at the labor. My own escape was probably due to the fact that I had suffered from small-pox two years previously.

Possibly many years hence, when wars and rumors of wars shall be unknown, and when the governments of different countries shall look upon the destruction of disease as a matter of primary importance, some attempt may be made on a large scale to stamp out several contagious disorders. But until this happy times arrives, and while the means of rapid transit from one country to another are constantly increasing, it would be hopeless to expect any permanent benefit for carrying out Sir James Simpson's proposal on such a small portion of the globe as is occupied by Great Britain.

The less drugs are used in the *treatment* of small-pox the better; inasmuch as they will neither shorten the disease, nor exert any favorable influence upon the eruption.* In the early stages, the patient should be kept quiet in bed, in a well-ventilated room free from carpets and curtains; iodine (F. 81), or sulphurous acid gas (F. 74), or carbolic acid, or some other disinfectant is to be employed. His diet should consist of arrowroot gruel, weak beef tea, mutton or chicken broth, bread and milk, and tea

* "It is a melancholy reflection, but too true, that for many hundred years the efforts of physicians were rather exerted to thwart nature, and to add to the malignancy of the disease, than to aid her in her efforts. Blisters, heating alexipharmic large bleedings, opiates, ointments, masks, and lotions to prevent pitting, were the great measures formerly pursued, not one of which can be recommended. Wh

with milk; he should be allowed plenty of lemonade, barley-water, plain water, raspberry-vinegar and water, soda-water, or ice; while ripe fruits, especially grapes and oranges, are unobjectionable. When the skin is very hot, tepid sponging will prove very refreshing, especially if its use be followed by a change of linen. Supposing that the bowels are confined, a few doses of some mild saline laxative (F. 139, 141, 148, 169, &c.), may be administered; if the throat be sore from the presence of many pustules, a gargle of tincture of myrrh in rose-water can be ordered, or some black currant jelly will relieve the sense of dryness: if there be diarrhœa, milk and rice, with some catechu and chalk mixture (F. 97), or bismuth and syrup of poppies (F. 112), will check it; while when there is great irritability and nervousness, a dose of morphia and chloroform, or of opium and henbane (F. 315, 317, 325, or 340), at bedtime, will do good. Where the maturation of the pustules goes on tardily, or imperfectly, good soups and cream and stimulants (wine or ether or ammonia) are indicated.

A decoction of the root of the Sarracenia purpurea, or pitcher-plant, has been extensively tried, owing to the statement of Dr. Chalmers Miles that this remedy is regarded as a specific by certain tribes of Indians. But while we must acknowledge ourselves indebted to Dr. Miles for the trouble he has taken in investigating the supposed properties of this plant, yet it is to be feared that he has labored in vain. It will suffice to give the experience of Mr. Marson, who employed it in fifteen severe cases at the Small-pox Hospital. The patients all died, as they would probably have done under any treatment. Mr. Marson remarks: "I cannot say that the Sarracenia had any effect whatever. It did not save life; it did not modify in the least the eruption; it did not influence any of the secretions; it did not increase the secretion of urine; in only one instance it seemed to act on the bowels; the seeming effect might, however, easily have been from other causes."*

In managing the *secondary fever*, the physician ought to keep the bowels gently open by mild laxatives; to administer sedatives if needful once or twice a day; and to support the system by nourishing but digestible diet, such as strong beef tea, good soup, plenty of milk or cream, the whole of one or two raw eggs daily, &c. Stimulants (champagne or claret) are to be given in proportion to the weakness of the patient. Sloughy and gangrenous sores demand the liberal administration of quinine or bark and nitric acid, or of steel and cod-liver oil; of fresh-cooked animal food; as well as of light bitter ale, or of wine, or even of brandy. When there is the least fear of the occurrence of ulceration on the back or nates, the patient should be placed on a water-bed, or on one of Hooper's large water-pillows. To relieve the intolerable itching, the pustules had better be frequently smeared with cold cream; or they may be painted with a mixture of one drachm of the solution of subacetate of lead in seven drachms of almond oil, or with what often answers better, the officinal lime liniment. When the pustules have burst, some dry powder (as the oxide of zinc, or powdered starch) is frequently freely applied, to absorb the matter, and perhaps to prevent the pitting. For the latter purpose, moreover, the

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think you of a prince of the blood royal of England (John, the son of Edward the Second) being treated for small-pox by being put into a bed surrounded with red hangings, covered with red blankets and a red counterpane, gargling his throat with mulberry wine, and sucking the red juice of pomegranates? Yet this was the boasted prescription of John of Gaddesden, who took no small credit to himself for bringing his royal patient safely through the disease." Lectures on the Eruptive Fevers, p. 78. By George Gregory, M.D. London, 1843.

* British Medical Journal, p. 22. London, July 4th, 1863.

application of poultices, oils, ointments, collodion, and mercurial plasters, over the face and hands, has been recommended; the object generally being to exclude air, lessen irritation, and to keep the tissues moist.

2. COW-POX.—Since the happy discovery of the protective influence of cow-pox or vaccinia by Jenner, towards the close of the eighteenth century, the fatality of small-pox has been very much diminished. And not only has the mortality been so considerably lessened, but the good looks of the people have been preserved by vaccination [*Vacca* = a cow]. "Unless the reader," says Dr. Andrew Wynter, "has scanned the long list of villanous portraits exhibited by the Hue and Cry in the old papers of the last portion of the seventeenth and first portion of the eighteenth centuries, he can form but a faint conception of the ravages committed by the small-pox upon the population. Every man seemed more or less to have been speckled with 'pock-holes;' and the race must have presented one moving mass of pits and scars."* Vaccination was first performed in England in 1796, in America in 1799, and in France in 1800. It is now highly probable that efficient vaccination confers a degree of immunity against small-pox almost, if not quite, equal to that obtained by inoculation; while it is decidedly safer, much less disgusting, and does not tend to perpetuate a loathsome disease, as the practice of inoculation did. Moreover, when small-pox occurs in an individual who has been properly vaccinated, as it sometimes will, the disease always proves much milder and of shorter duration; while it is usually unaccompanied by secondary fever. It is spoken of under these circumstances as *varioloid*, or *modified* small-pox. These facts receive a ready explanation at the hands of Mr. Ceely, for this gentleman has proved by experiments that vaccinia and variola are one and the same disease, the virus in the former having become modified by being passed through the system of the cow.

Vaccination is usually performed, for the first time, when the child is about four or six weeks old. It may, however, be practiced on a healthy infant within a few hours of its birth, if from the presence of an epidemic of small-pox it be thought desirable to shield it very early from the chance of variolous infection. The resulting phenomena are neither more nor less severe than are met with in children of more advanced age. Nevertheless, as a general rule, it is better to postpone the operation until after the end of the first month; chiefly because, under ordinary circumstances, there is no advantage in very early vaccination to compensate for the mental distress which it occasions to the mother. The fact is, that a feeling against early vaccination is rife in the public mind. Doubtless this is only a prejudice. At the same time, it is a prejudice which I should advise the practitioner to respect, save under some special emergency.

When vaccine lymph has been successfully introduced beneath the cuticle of a healthy child, an elevation may be felt over the puncture on the second day, accompanied by slight redness; on the fifth, a distinct vesicle is formed, having an elevated edge and depressed centre; while on the eighth, it is of a pearl color, and is distended with a clear lymph. This lymph consists of a transparent serum; floating in which are leucocytes, or bodies resembling the white corpuscles of the blood, and elementary granules of less definite structure. The vesicle is composed of a number of cells, by the walls and floor of which the lymph is secreted. An inflamed ring or areola then begins to form round the base of the little tumor, and to increase during the two succeeding days; about the eleventh day it fades; and the vesicle, which

* Quarterly Review, Article "Advertisements." London, July, 1855.

has now burst and acquired a brown color, gradually dries up, until, by the end of the second week, it has become converted into a hard and round scab. This falls off about the twenty-first day, leaving a circular, depressed, striated, cicatrix, which is permanent in after-life.

According to the official instructions issued to the public vaccinators in England, four or five separate punctures or scratches are to be made "so as to produce four or five separate, good-sized vesicles." The skin over the deltoid offers a good site. The first vaccination certainly affords protection for from seven to ten years, and perhaps for longer; but it is clearly a safe proceeding to revaccinate after this lapse of time.

The constitutional disturbance which accompanies vaccination is usually very slight. Between the sixth and ninth days there is a little febrile disturbance—vaccinal fever, accompanied by heat of skin and restlessness and acceleration of pulse. Eruptions of vaccine lichen or roseola sometimes appear, and may last for a week. Several interesting experiments, made a few years ago, by Dr. Gustav Wertheim, of Vienna, tend to show that the frequency of the pulse is permanently increased by the process of vaccination. Thus, a man, aged thirty-eight, and a woman, aged thirty-three, neither of whom have suffered from small-pox, were vaccinated for the first time; the pulse, in both cases, increased in frequency up to the sixth day after vaccination, when it began to decline; never declining—not at least for the four months, during which the observations were continued—as low as it was before the introduction of the vaccine virus. For example, before vaccination, the man's pulse was on an average 66; afterwards, the average was 78.

A popular belief has long existed that vaccination is occasionally the means of engrafting upon the constitution some impure disease. This opinion must no longer be ignored. As nothing is more common than to hear a mother assert in the hospital out-patient room: "My child has never been well since he was vaccinated," so it is not surprising that a large number of the poor ignore the Act of Parliament, rendering vaccination compulsory, and decline to submit their children to what they regard as a certain evil, for the sake of a doubtful benefit. There can be no question that vaccination is often most carelessly and inefficiently performed. There is as little doubt but that in vaccinating we can not only introduce the cow-pox into the system, but by using a dirty lancet or foul lymph we can possibly induce that condition of blood-contamination known as pyæmia. And then, again, it is impossible to disbelieve the abundant evidence which now exists, as to the fact of syphilis having been communicated by vaccination.

In 1856, Dr. Whitehead, of Manchester, wrote that he had "seen several instances of the transference of the syphilitic taint through the medium of vaccination."* This opinion, though almost unsupported at the time by the experience of others, is doubtless correct. Numerous facts which seem to corroborate it could be adduced; but it will probably suffice to mention one—certainly a very startling instance. It occurred at Rivalta, a village in Piedmont, containing about two thousand inhabitants, where syphilis was said to be previously unknown. Here, on May 24th, 1861, a child eleven months old was vaccinated with a clean lancet from lymph out of a capillary tube. The infant was at the time apparently healthy; though it is probable that it had been infected two or three months previously with constitutional syphilis through being suckled on a few occasions by an unhealthy woman. From this child, on June 2d, forty-six children were vac-

* Papers relating to the History and Practice of Vaccination, presented to the Board of Health by Mr. Simon, p. 114. London, 1857.

cinated. And ten days subsequently one of these forty-six children furnished lymph for the vaccination of seventeen others. What is said to have followed has not been denied, and cannot be explained away. Within two months forty-six of the whole number of children were affected with a disease which was said to be syphilis by a commission of medical men appointed to examine the subject. Seven of the children died, the earliest death occurring three months after the vaccination. The first vaccinifer, after suffering from marasmus, alopecia, &c., recovered. The disease was also communicated by the children to twenty nurses or mothers; in three cases by the mothers to their husbands; and in three other cases by the children to their little playmates.* The only inference which it seems possible to draw from the foregoing is this: That the lymph by which the first child was vaccinated was pure; but that the lymph taken away from it ten days subsequently, had become contaminated with syphilis. Hence, from this vaccinifer there was communicated the cow-pox, as well as, in a great majority of the cases, syphilis. The cow-pox appeared first and ran its natural course, because its period of incubation is only a few days. The syphilitic ulceration made its appearance on the inoculated part some time afterwards, and in due season was followed by secondary symptoms. The time of incubation in constitutional syphilis is from three to seven weeks.

But if the reader is still incredulous, and requires more confirmatory evidence, I would refer him to an admirable paper by Dr. Viennois.† This gentleman, after a full and careful investigation of the question, has come to the conclusion that if the lymph from a vaccine vesicle alone be inoculated, the cow-pox alone will be introduced; but if, in addition, the blood of a person with constitutional syphilis be also inoculated, then syphilis may likewise be communicated.

In a very small number of cases vaccination has been followed by erysipelas. Occasionally also, sloughing sores have been produced. Thus, in 1862, some lamentable results followed upon the vaccination of the soldiers of one division of the American Confederate Army. A few days after the insertion of the virus—in many cases within twenty-four hours—the seat of puncture became very much inflamed, with a deep inflammatory flush around it; the morbid action progressing until nearly the whole limb was affected. A pustule rapidly formed, which soon discharged an ichorous fluid; this fluid forming a dark mahogany-colored scab in the course of forty-eight hours. This scab gradually increased in size until it was perhaps more than two inches in diameter; pus exuded from beneath it; and when it became detached a foul phagedenic ulcer was revealed, involving the subcutaneous connective tissue, and often exposing the muscular fibres beneath. As this ulcer spread the axillary glands enlarged, and sometimes freely suppurated; while wherever the ichorous pus from the ulcer touched the sound skin a similar pustule was formed.‡ The cause of these phenomena was doubtless the vitiated condition of the blood of the soldiers owing to their improper and spare diet, and their inability to attend to cleanliness. The disease resembled ecthyma, was of a scorbutic character, and was in no way due to any syphilitic virus.

Now what is to be learned from these observations? Are they to shake

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* The facts are given at great length by Dr. Giacinto Pacchiotti, Professor of Clinical Surgery at Turin, in his pamphlet, entitled Sifilide trasmessa per Mezzo della Vaccinazione in Rivalta, presso Acqui. Torino, 1862.

† Archives Générales de Médecine, vol. i, p. 641; vol. ii, pp. 32, 297. Paris, 1860.

‡ Report on Spurious Vaccination in the Confederate Army, by S. E. Habersham, M.D., &c. Southern Medical and Surgical Journal, vol. xxi, p. 1. Augusta, Georgia, 1866.

our faith in the value of vaccination? Or are they to be set aside as being very exceptional cases? I believe that neither proceeding will follow; for the facts merely prove what has long been known, that vaccination, like every other operation on the human body, demands care and skill in its performance. The evils of pyæmia and phagedenic ulceration and syphilis which have ensued in certain cases have been due either to the use of a foul lancet, or of lymph which from remaining too long in the vesicle had begun to decay; or they may have arisen from employing lymph mixed with the blood of a diseased subject, or in consequence of the person vaccinated being in an unhealthy condition. The remedies are therefore very simple. Practitioners being forewarned will be forearmed. They must (1) be careful to employ a clean lancet. (2) The subject supplying the lymph must be healthy. (3) The subject to be vaccinated ought to be healthy, as a rule. And (4) clear pure lymph should be taken, on the eighth day, *unmixed with blood or pus or any other secretion*. Let these rules be followed, and we shall hear no more of vaccino-syphilitic inoculation.

It only remains to say that vaccine lymph can be well preserved in hermetically sealed capillary tubes; a plan of keeping the matter, in my opinion, much to be preferred to any other. If from any cause great economy has to be practiced in using the lymph, it may be diluted with not more than ten times its weight of glycerin or water. But when possible, it is far better for the virus to be taken direct from a healthy child—arm-to-arm vaccination; or even, if practicable, from the cow. The advantages of animal vaccination have been more generally recognized on the Continent than in this country, though it needs but little consideration to see that lymph taken from an animal vaccinifer is more likely to be active than that obtained by human transmission, while especially is it more certain to be pure. And as a result of practical experience it has been found, that in animal vaccination (from the calf to the human subject) the success is nearly universal, the period of incubation is longer, the pustules larger, and hence the local inflammation more severe, while the general disturbance is more marked. Dairy-women are often infected from milking cows having the eruption of vaccinia on their teats.

According to the Act of Parliament—16 and 17 Victoria, cap. 100—which was passed in 1853, every infant is to be vaccinated within three calendar months from birth, unless its health renders the proceeding objectionable; or unless the father and mother are dead, or ill, or unable to attend, when a month's grace is to be granted. In July, 1855, another bill was passed—18 and 19 Victoria—making it compulsory on all adults not protected by vaccination or an attack of small-pox, to undergo vaccination; while the time for infants was limited to three months, under all circumstances. Again, in March, 1856, it was enacted—19 Victoria—that all children born after January 1st, 1857, should be vaccinated within four calendar months of birth. And then, finally, by 30 and 31 Victoria, an act was passed on August 12th, 1867, to consolidate and amend the laws relating to vaccination. By this bill, which came into operation on January 1st, 1868, it is enacted that parts of certain preceding acts are repealed; that public vaccinators are to be appointed for different districts; that parents or guardians are to procure the vaccination of every child within three months of birth, unless the child is not in a fit and proper state of health for the operation; that parents neglecting to procure vaccination, or failing after vaccination to have the child inspected, may be fined twenty shillings; and that any person practicing inoculation with variolous matter, or in any way wilfully producing small-pox in another individual, shall be liable to a month's imprisonment.

Hitherto it has been most unsatisfactory to find that the intentions o the legislature have been very imperfectly fulfilled—so imperfectly, tha according to Mr. Simon, "the public defences against small-pox are i great part insufficient and delusive."* It is, however, to be hoped tha this slur upon our national character will no longer be allowed to exist The fact would seem to be, that vaccination, even as hitherto practiced has so far relieved the human race from such a malignant disease, that th public can form no adequate idea of the ravages which the latter com mitted when unfettered. And so, instead of showing any gratitude for th comparative immunity now enjoyed, there are some people who industri ously endeavor to restore to us this loathsome disorder with all its origina force; while others, who, as legislators, ought to know better, remove th London statue of Jenner from the locality where it might have inculcated a valuable lesson, to a secluded spot in which it is safe from the gaze o those who owe so much to the genius of the man it represents.

3. CHICKEN-POX.—Chicken-pox, or varicella, is a trifling complaint, which is almost peculiar to infants and children under the age of twelve years, and which sometimes prevails as an epidemic. The disease completely runs through all its phases in six or seven days.

Varicella [the dim. of *Variola*] has some resemblance to modified small-pox; and there can be no doubt, that in many of the cases which have been recorded of recurrent variola, one of the attacks has been simply chicken-pox. The two affections were formerly confounded together, prior to 1730; but no one in the present day doubts their non-identity. It is true that some confusion exists with regard to Professor Hebra's views; but this has chiefly arisen in consequence of his using the term varicella in a different sense to that with which we are accustomed to connect it in this country.

Chicken-pox may be said to consist of an eruption of small rose pimples, which appear at the end of twenty-four hours from the commencement of the mild initiatory fever. These pimples, on the second day, become converted into transparent vesicles surrounded by slight redness. The rash commences on the shoulders and back, and afterwards affects the scalp, but often spares the face; while about the fourth day the vesicles form small scabs, which rapidly desiccate. In a very few instances permanent "pitting" will possibly result. There is no constitutional disturbance of the least importance, and the accompanying pyrexia is slight throughout. There may be symptoms of catarrh. Dr. Gregory says, that when the eruption is abundant the body presents the appearance of having been exposed to a momentary shower of boiling water, each drop of which has caused a small blister.

Chicken-pox occurs but once to the same person; it has a short incubation, probably of four days; it is slightly infectious, and it requires no treatment beyond attention to the bowels, confinement to the bed-room and restriction of the diet. When there is evidence of weakness during convalescence, proper nourishment, with bark, or quinine, or small doses of steel, will soon restore health and strength.

4. MEASLES.—Morbilli, or measles, may be described as a continued infectious fever; the result of the absorption of, and contamination of the blood by, a morbid poison. The disease is preceded by catarrh, accom

* Fifth Report of the Medical Officer of the Privy Council, p. 6. Ordered by the House of Commons to be printed, April 14th, 1863.

panied by a crimson rash, and often attended or followed by inflammation of the mucous membrane of the organs of respiration. Severe epidemics of morbilli* occasionally prevail. As a rule, the susceptibility to this disease is destroyed by one attack. Some authors divide measles into two grades,—the *morbilli mitiores*, and the *morbilli graviores*; but the latter only differs from the former in its greater severity, and in the fact that the eruption assumes a dark purple color.

The length of incubation—or in other words, the time which elapses between the date of infection and the appearance of the disease—is from ten to fourteen days. Sir Thomas Watson has known several instances in which it was exactly a fortnight. Occasionally, the patient suffers from languor, cough, and a sense of discomfort, during the breeding or incubative period.

The early *symptoms* of measles are lassitude, shivering, pyrexia, and catarrh; the conjunctivæ, pituitary membrane, and mucous lining of the fauces and larynx and bronchi being much affected. Very soon there is swelling of the eyelids, with eyes suffused and watery and intolerant of light; troublesome sneezing; dry hacking cough, hoarseness, and severe dyspnœa; drowsiness; great heat of skin; together with a frequent and hard pulse. Headache, and even pains in the back are sometimes complained of; and there may be nausea with frequent attacks of retching, epistaxis, diarrhœa, deafness, prostration, confusion of intellect, &c. Actual delirium is rare. In young children especially, convulsions are not uncommon at the onset. Occasionally albuminuria is found or the urine may contain blood: an abundance of urates is the most constant condition. The morbillous eruption comes out on the fourth day of the disease; seldom doing so earlier, often being later. It consists of little circular dots, like flea-bites, which gradually coalesce into small blotches of a raspberry color; these presenting often a horseshoe shape, and being slightly raised above the surface of the skin.

The rash appears first on the forehead and face, and gradually extends downwards. It begins to fade on the seventh day in the same order; and is succeeded by slight desquamation of the cuticle, with considerable itching.

It is worthy of notice that the fever does not abate on the appearance of the eruption, as in small-pox; nor does the severity of the attack at all depend upon the quantity of the rash. In many cases the patient is taken very ill, and abruptly so, on the first day of the fever. On the second and third he is better, so that the opinion of measles being the disorder is almost abandoned. But on the morning of the fourth day the lachrymation, nasal discharge, weakness, and fever, all again become aggravated; while the rash is then seen to be commencing on the forehead. The sixth day is usually the worst. The contagion of measles is strong; but less powerful than that of variola. The disease is mostly seen in children.

The *prognosis* must depend upon the mildness or severity of the chest symptoms; the complications most to be feared being croup, hooping-cough, capillary bronchitis, collapse of the lung, pulmonary abscess, and pneumonia. Convulsions occurring towards the decline are of much more serious import than when they usher in the disease. Strumous children are comparatively unfavorable subjects for this as for other fevers. Among the children of the very poor, gangrenous stomatitis may occur; but fortunately this fearful complication is seldom met with. The diarrhœa, which often sets in as the rash declines, is for the most part beneficial.

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* Morbilli, the dim. of *Morbus* = a disease. Μορος βιου, the fate of life, *i. e.*, death.

The mortality is greater in large cities than in the country. And mor over, this disease is as fatal now as formerly. In the years 1660–79, t annual deaths from measles, in London, averaged 40 to 100,000 person whereas in 1859 they were 47 to the same number. The fatality of measl is greater during the cold than the warm seasons of the year.

The *treatment* must not be too active; and ought chiefly to be direct towards keeping the disease uncomplicated. Exposure to cold is to be ca fully avoided. The patient should be confined to bed, in an apartme moderately warm. Putting the feet in hot water every evening is oft beneficial. Milk diet, mucilaginous drinks, gentle aperients, and mi diaphoretics may be had recourse to. A draught, containing half a drach of the liquor ammonia acetatis, ten or twenty drops of the spiritus æthe nitrosi, and half an ounce of camphor-water, may be given to a child s years old every four or six hours. The cough can often be relieved by sinapism to the chest, and by very small doses of morphia.

The state of the three great cavities had better be carefully watche especially towards the decline of the eruption. Should any head or ch or abdominal complications arise, they must be treated according to t rules which will be laid down in speaking of each affection. After the d ease has subsided, the patient is to be warmly clad; to be fed on easi digested nourishing food, and to have quinine and steel, with cod-liver o if needed; while he is not to be allowed to go out of doors too early. one of the rare *sequelæ* of measles, paralysis may be mentioned. In the fe cases which I have seen it has taken the form of paraplegia; power beir restored to the legs as the general nutrition has been improved by milk ar animal food, cod-liver oil with steel, and sea air. Friction of the spi and lower extremities, together with tepid salt-water baths, may be reco mended.

The inoculation of measles has occasionally been practiced since 175 The description of the results, however, is too contradictory to admit of ar safe deduction. In this country it does not appear to have been resorte to subsequent to the commencement of the present century; and it woul hardly be advisable to revive the proceeding now.

5. SCARLET FEVER.—This well-known disease may be defined as a infectious febrile affection, which manifests itself after a period of incub tion of from four to six days. It is characterized by a scarlet efflorescenc of variable intensity, upon the skin and mucous membrane of the fauc and tonsils; the efflorescence commencing about the second day of th fever, and declining about the fifth. Scarlet fever, or scarlatina, is oft accompanied by inflammation of the throat, and sometimes of the subma illary glands. Like measles, it is essentially a disease of childhood; b it is more to be dreaded. As a rule, scarlet fever occurs only once duri life. In the event of a second attack there is often no rash, little or throat affection, and the disorder runs a favorable course. From my ov personal experience, I can state that *scarlatina sine exanthemate* may be fo lowed immediately by desquamation of the cuticle; and subsequently l renal congestion with albuminuria.

The scarlatinal poison is of a subtle nature, and does not appear to lo its power for some time. It attaches itself to bedding, carpets, clothes, &c or in other words it may be transmitted by fomites, as is proved by ma medical men having carried the disease to their own families. The poi appears to be destroyed by a temperature of 205° F. The infecting pov is probably greatest at the beginning of desquamation. In my opin there is some relation between the severity of the disease in the recipi

and that in the individual yielding the poison. I know of cases somewhat like the following: A servant girl at a small school at Hampstead paid a short visit one evening to a relative suffering from severe scarlet fever. In due time she was attacked with the disease, together with three of the pupils. All the five died. One of the boys was removed directly the first symptoms set in, and brought to a healthy locality in London. I saw him a few hours afterwards, and gave a very unfavorable prognosis; which was unfortunately justified, for he sank completely exhausted three days afterwards, in spite of the most careful nursing.

Attention has been of late directed to the circumstance that patients who have recently undergone a surgical operation, or who have wounded themselves accidentally, may suffer from a rash which cannot be distinguished from scarlatina, and which is followed by desquamation; although no history can be obtained of their having been exposed to infection. Dr. George May, of Reading, has reported* the case of a boy who suffered from a scarlet rash with fever, on the sixth day after receiving a scalp wound. The rash lasted a few days, was succeeded by complete desquamation, as well as by swelling of the glands on the left side of the neck. Yet the patient was believed to have previously suffered from scarlet fever; while there was no case of this disease in the village at the time of his illness, neither was any one else in the house affected by it. Dr. Wilks, Mr. Paget, and Mr. Hutchinson seem to have met with similar instances. It is, however, most probable that these were all examples of severe erythema, such as I have occasionally seen produced by the administration of belladonna or of nux vomica. We certainly are without any evidence to show that a poison like that of scarlet fever can be generated by a surgical operation.

Varieties.—There are three varieties of this disorder. Scarlatina *simplex*, in which the skin is chiefly affected; scarlatina *anginosa*, in which both skin and throat are decidedly implicated; and scarlatina *maligna*, in which all the force of the disease seems to be expended upon the throat.

According to the researches of Dr. Fenwick it seems probable that in all varieties a primary effect of the poison of scarlet fever is suddenly and violently to stimulate the natural cell growths of the various secreting organs. With regard to the stomach, the bloodvessels get congested, the epithelium is stripped from the tubes, and the tissues become softened. The tubes are found distended by granular and fatty matters, or by cells mixed with granules. Although it cannot be considered as proved at present, yet it is most likely, that after scarlet fever the epithelium of the stomach and intestines desquamates, just as this process takes place on the skin. The cells lining the tubules of the kidney are probably cast off in the same manner.

Scarlatina simplex, or *scarlatina sine anginâ*, commences (after a latent period of from four to six days) with slight soreness about the throat, nausea or vomiting, chilliness soon succeeded by fever, lassitude, and headache. The pulse is frequent, the skin may have a temperature of 103° or 104°, deglutition is somewhat difficult, and there may be restlessness with wandering at night. Convulsions very rarely happen. The eruption appears on the second day, in the form of numberless bright red points, which show themselves first on the face and neck, then on the arms and abdomen, and lastly on the lower extremities. Sometimes the rash comes out so quickly that in twenty-four hours from the first appearance it covers the whole body; though more commonly a day intervenes between each crop. On

* British Medical Journal, p. 428. London, October 8th, 1864.

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Scarlatina maligna, described by Cullen under the title of *Cynanche maligna*, differs but little in its symptoms, at first, from scarlatina anginosa. The fever, however, soon assumes a malignant or typhoid character; considerable cerebral disturbance being superadded to the affection of the fauces and skin. There is great irritability, restlessness, a feeble, irregular pulse, oppressed respiration, obstruction of the fauces with viscid phlegm, occasionally diarrhœa, and generally delirium; the latter being sometimes of a violent, but usually of the low muttering kind. The tongue is dry and brown, tender and chapped; the lips, teeth, and gums are covered with sordes; and the breath is extremely fetid. The throat is not much swollen, but appears of a dusky red hue; while the velum, uvula, and tonsils, are coated with dark incrustations, consisting of exudations of lymph. In some cases, there is gangrenous inflammation of these parts, followed by sloughing. The cervical glands are often involved in the inflammation. The rash is exceedingly irregular as to the time of its appearance and duration; often coming out late, disappearing after a few hours, and being renewed several times during the progress of the disorder. It is at first of a pale hue, but soon becomes changed to a dark livid red; while petechiæ also often appear upon the skin.

In many instances, this malignant form of scarlet fever terminates fatally on the third or fourth day. It is always a disease of such extreme danger that only patients with vigorous constitutions survive it: great hopes may be entertained, however, if the seventh day be passed.

Sequelæ.—Children who have suffered from scarlet fever are very liable to have their health permanently affected, and to become afflicted with some of the many forms of scrofula; especially strumous ulcers, ophthalmia, scrofulous enlargements of the cervical glands, abscesses in the ears, diseases of the scalp, &c. They also seem predisposed to suffer, either during the attack or shortly afterwards, from *acute rheumatism* and from *rheumatic pericarditis*.

The persistence of *otorrhœa*, or purulent discharges from one or both ears, for weeks after recovery from the fever, should excite attention; since this affection not unfrequently proves the first step towards destruction of the membrana tympani, a loosening and expulsion of the ossicula auditûs, inflammation of the petrous portion of the temporal bone, and abscess of the brain. These successive phases of a troublesome disease may not be run through for ten, or fourteen, or twenty years; but it is not the less important to try and control the evil at the onset. The most hopeful plan for accomplishing this is to use astringent injections, to apply small flying blisters behind the affected ear, to administer steel and cod-liver oil, to allow good nourishment, and to send the child to a bracing seaside residence for a long time.

Not unfrequently, after the decline of the eruptive stage, a muco-purulent discharge takes place from the nares, and even from the mouth and fauces; while in a few instances an acrid secretion, similar in character, has flowed from the vagina in female children and women. Considering how extensively the various mucous tracts are affected in this disease, it seems strange that *scarlatinal vaginitis* is not of more common occurrence. In one case (a girl twelve years of age) about which I was consulted, the nares, mouth, and pharynx were also affected, but the vaginal inflammation was the most obstinate, and persisted for a long time after convalescence had been firmly established. A cure was effected by the adoption of the plan of treatment just advised for obstinate otorrhœa, together with the local use of astringents. Dr. Robert Barnes and Dr. J. R. Cormack

of coagulated fibrin, blood-corpuscles, epithelial casts and cells, with occasionally crystals of uric acid. When the progress of the case is unfavorable, the secretion of urine gets nearly or completely suppressed; death happening from convulsions or coma, the consequence of uræmic toxæmia, in some few days. Fortunately, a favorable termination is the rule, and then the earliest signs of improvement are the disappearance of the dropsy, coincidently with an increase in the quantity of urine. It is not uncommon for a patient, during convalescence from acute desquamative nephritis, to pass from four to six pints of urine in the twenty-four hours; the natural quantity averaging only from a pint and a half to two pints.*

Mortality.—In England in 1866, the deaths from scarlet fever were comparatively small, amounting only to 11,685; of which number 7719, or [illegible] occurred in children under five years of age, while of these 690 were less than twelve months old. It is thus clear that young infants are not exempt from severe attacks of this disease as some authorities have asserted.

The fatality varies much in different epidemics. But speaking generally, the mortality would seem to be from 5 to 15 per cent. The most severe epidemics have generally occurred between the middle of the months of September and the commencement of December. Lastly, this fever occurs equally in both sexes.

Treatment.—The management of scarlatina yet remains to be considered. The *simple form*, says Sydenham, is "fatal only through the officiousness of the doctor." It requires no treatment beyond confinement to the bedroom, a warm bath or two, proper clothing, an unstimulating diet, plenty of cold water acidulated with vinegar as a common drink, and attention to the bowels. Medical advice ought always to be sought, however, in these cases; since they are just those in which the most troublesome sequelæ are apt to occur.

The patient should be separated from his family; but there will be little fear of the fever spreading through the house provided his room is kept efficiently ventilated, and his attendants are not allowed to mix with the other domestics. Fumigation with sulphurous acid gas (F. 74) is to be practiced. Moreover, the danger of infection can scarcely be regarded as over, until some few days after the termination of desquamation; while the sick-room is not again to be inhabited until it has been thoroughly purified.

By some practitioners the administration of ammonia, by others the use of acetic acid is recommended in all cases of scarlet fever from the commencement. The chief value of these remedies seems to be that they possess the property of keeping the fibrin of the blood fluid. The ammonia has appeared to me to prove most beneficial where there has been any tendency to depression; while the acid has been preferable when the employment of a cooling refrigerant drink has been indicated.

For *scarlatina anginosa* the treatment is much the same as that for continued fever. Recourse is to be had to cold or tepid sponging with vinegar and water (F. 138), where there is great heat; emetics of ipecacuanha when the tongue is much coated, and when nausea and irritability of stomach exist; shaving the scalp and the application of cold lotions where there is much delirium, and to the cautious administration of aperients

* For the more full consideration of this renal affection, as well as for its treatment, &c., the reader must consult the Section on Acute Bright's Disease (Acute Albuminuria, Acute Desquamative Nephritis, &c.), in Part XI, as well as the Subsection on Uræmia, in Section I, of Part I.

[illegible] The treatment of a poisonous snake is the [illegible] Dr. James Dewar, [illegible] permanganate [illegible] strength. [illegible] may be [illegible]

[illegible] such as [illegible] are [illegible] The usual [illegible] unless [illegible] quinine or [illegible] [illegible] solution [illegible] does good [illegible] The dangerous depression [illegible] the [illegible] the [illegible] [illegible] the [illegible] [illegible] [illegible]

6. DENGUE.—This affection, very rarely seen in Great Britain, is an epidemic, and perhaps infectious, fever; which is attended with an exanthematous eruption, severe headache, pain in one eyeball or behind one ear, and very distressing rheumatic or neuralgic pains in the limbs and joints. Sometimes the throat is inflamed, occasionally the testicles enlarge, and often the lymphatic glands of the neck and groin swell. One attack affords subsequent protection. The disease often gives rise to severe symptoms, but seems to be seldom fatal. It lasts from eight or ten days, to five or six weeks: remissions and relapses are common. It is known as *Dengue*, a name of uncertain derivation; as *Dandy fever*, in the West Indies; as *Breakbone fever*, in Philadelphia; and as *Scarlatina rheumatica*, *Eruptive articular fever*, *Eruptive rheumatic fever*, &c., in other countries.

An affection supposed to be dengue prevailed in Philadelphia in 1780. This fever was common in many parts of the East Indies, and especially in Calcutta, in 1824–25; in the West India Islands, in 1827–28; and during the same years in the Southern States of America, where it was also epidemic in 1847 and 1849. Again, in 1859–60, it became epidemic in Virginia; where it prevailed so universally that one practitioner alone (Dr. R. T. Lemmon) attended upwards of three hundred cases. Out of this number only ten died. Of these fatal cases, four were negroes over seventy years of age; one was a child, who was teething and had convulsions; two deaths were from tetanus; one from congestion of the lungs; one from epistaxis; and one from softening of the liver and stomach, with the symptoms of yellow fever.* As an illustration of the way in which all classes have been attacked in these epidemics it may be mentioned, that the editor of the *Southern Medical and Surgical Journal*, in his issue for December, 1849, apologizes for typographical errors by saying: "The editor, publisher, and printers are all suffering from *breakbone fever*." The population of the village of New Iberia, in Louisiana, did not exceed 250 in the year 1851. Yet, according to Dr. Duperier, in six weeks 210 of the residents had gone through an attack of this fever; while 40 of the inhabitants of the neighborhood had also suffered from it.

The attack usually commences suddenly with vomiting, headache, and pains in the limbs. Sometimes there is chilliness, but distinct rigors are uncommon. The joints swell; beginning perhaps with one knee, or only with the small articulations of the hands and feet. Pain at the back of the neck, often starting from one mastoid process, is not uncommon. The headache is usually severe, and may be conjoined with pain in the eyeballs. The skin is hot and dry; all appetite is lost, while there is much thirst; the tongue is red; the bowels are torpid; and the pulse is small and feeble, sometimes being very rapid and sometimes remarkably infrequent. Violent cramps in the muscles of the extremities, abdomen, loins, or chest are not uncommon. The articular pains may be so severe that the slightest movement causes a sharp cry. The testicles and other glands swell. Perhaps about the end of the third day, it may be much earlier, there is a remission of the fever; the patient being left in a state of prostration. But on the fifth or sixth day the nausea and heat of skin and muscular pains return; and this time an eruption appears. This eruption is said by some observers to consist of a scarlet efflorescence, which commences on the palms of the hands and rapidly spreads over the body. But according to Dr. Lemmon, the character of the rash is not uniform; for in some of his cases it simulated scarlatina, in others chicken-pox, and in

* The American Medical Times, vol. ii, p. 120. New York, 1861.

others herpes annularis. Then the symptoms gradually subside, unless there have been any complications,—such as pneumonia, bronchitis, jaundice, erysipelas, carbuncle, rheumatic ophthalmia, or tetanus. There may be general desquamation, but this is not constant. The disease always leaves the sufferer much weakened; while sometimes convalescents are annoyed with attacks of neuralgia and myalgia, necessitating the employment of quinine with large quantities of nourishment.

The remedies required in the management of a case of dengue are not numerous. The disease has a strong tendency to end favorably, after running a certain course which drugs cannot abridge; and consequently all that can be done by the physician is to guard against complications, and to relieve any urgent symptoms as they arise. Antacid purgatives will perhaps be useful, as may sudorifics; while the relief of pain by opium always proves grateful to the patient, without being provocative of any injurious consequences. Where profuse sweating sets in at the end of a few days, it is generally critical; and consequently should not be checked. During convalescence, bark or quinine, with milk and animal food, will best assist in making the recovery sure. Alcoholic stimulants have also been found beneficial.

7. ERYSIPELAS.—This is a specific disease (popularly called in Scotland the *Rose*, in this country *St. Anthony's fire*) characterized by a low form of fever, with a diffused and spreading inflammatory affection of the skin, and very commonly of the subcutaneous connective tissue.

Erysipelas [from *Ἐρύω* = to draw + *πέλας* = near—expressive of its tendency to spread; or, according to German lexicographers, from *Ἐρυθρός* = red + *πέλλος* = livid—livid redness] is accompanied by the general phenomena of fever; while the affected structures all become of a deep red color, hot, painful, and swollen. It is a miasmatic disease, due to the absorption of a specific poison. The miasm is most readily generated by the assembling together, in one ward, of patients with unhealthy discharges or secretions; especially if there be faulty ventilation, and a meagre employment of disinfectants.

No portion of the surface of the body is exempt from attacks of this disorder. But the integuments of the face and head are most commonly the seats of *idiopathic* erysipelas—that which arises from internal causes; while *traumatic* erysipelas, or such as follows wounds, commences at or around the seat of injury.

Idiopathic erysipelas resembles the other eruptive fevers; inasmuch as its phenomena are preceded by a period of incubation which varies from three to seven days, and are accompanied by fever and general constitutional disturbance. It often sets in with chilliness followed by distinct rigors; sore throat is an early and frequent accompaniment of it; occasionally the urine contains albumen, but the chlorides are always diminished; and disturbance of the cerebral functions, nausea, vomiting, and diarrhœa will often also be present. The delirium may be of that low, muttering kind frequently observed in fever; or the patient, especially if he be of intemperate habits, turns out noisy and violent. Then, on the second or third morning from the rigor, redness and swelling appear on some part of the skin; frequently on one side of the nose, spreading to the rest of the face, and often extending over the scalp, neck, and shoulders. The lips swell, the cheeks enlarge, the eyes become closed by their puffy lids, and all traces of the natural features are completely lost. The temperature of the body ranges between 99° and 105°; the pulse is frequent, 100 to 120; the lymphatic vessels and glands in the neighborhood of the disease are

apt to get inflamed; and the tongue will be found thickly furred, or dry and of a dark-brown color. After three or four days, the redness fades, the swelling subsides, and the cuticle desquamates. In most cases the inflammation is merely superficial, and the disorder is then spoken of as *simple* or *cutaneous* erysipelas; but occasionally it affects the subcutaneous connective tissue (*phlegmonous* or *cellulo-cutaneous* erysipelas) and is then apt to be followed by suppuration and sloughing, or even by gangrene.

Erysipelas now and then proves fatal, by the extension of the inflammation to the brain or its membranes, giving rise to effusion and coma. The same result may occur from the mucous membrane of the glottis becoming affected, so that the chink gets closed, and the patient dies unexpectedly from suffocation. In other cases, death is owing to the failure of the vital powers. The presence of albumen in the urine is unfavorable, especially if it be the result of pre-existing renal disease. Erysipelas occurring in cases of diabetes, gout, cancer, &c., is very dangerous.

Erysipelas can be generated by inattention to sanitary laws. It is infectious, and it spreads by fomites. One attack is no safeguard against subsequent seizures. A medical man should never visit a lying-in patient on the same day that he attends a case of this disease, without changing his clothes and using some disinfectant solution to his hands. The poison of erysipelas can undoubtedly give rise to puerperal fever. When erysipelas prevails epidemically, as it sometimes does, intemperance and insufficient food and foul air and trifling injuries favor its occurrence. If the disease breaks out in a hospital, the ward where it has appeared should be cleared out and thoroughly cleaned, to prevent the spread of the poison through the entire building.

The *mortality* from erysipelas in England averages about 1800 annually. It is remarkable that the figures fluctuate very slightly. Thus, for ten years (1857–1866) the highest number for any one year is 2104; while the lowest is 1523. Both sexes suffer equally.

The *treatment* must be conducted on the principle that it is more important to lead the disorder to a safe termination, than to try and cut it short by active remedies. At the commencement, the diet ought to be light; ice and cooling drinks may be freely given; while the patient must be confined to bed in a well-ventilated room. In the country, when the patients are young and vigorous, bleeding is commonly considered necessary: in London such practice would almost invariably be bad. The cases which have fallen under my own notice, have certainly been characterized by evidence of debility; and I have consequently followed the practice of those physicians who adopt a tonic mode of treatment as the great rule in idiopathic erysipelas. The late Dr. Robert Williams, of St. Thomas's Hospital, gave all his erysipelatous patients milk diet, sago, very gentle purgatives, and from four to six ounces of port wine daily, from the very first appearance of the disease, irrespective of the symptoms or the part affected. Speaking of the result he says, in his admirable work—"I have pursued this system for several years, and I hardly remember a case in which it has not been successful."* The carbonate of ammonia (F. 361, 371) will often prove an excellent substitute for wine. Bark or quinine can also be recommended.

In addition to the administration of wine, there are some cases where the tincture of perchloride of iron does great good. This medicine had better be commenced early; and the dose must vary from thirty to forty minims, every four hours in mild cases, to half a drachm every hour in

* Elements of Practical Medicine. Morbid Poisons, vol. i, 284. London, 1836–39.

urgent instances. According to some writers, attacks of erysipelas which would probably run on for eight or ten days may be cured in three or four days by this preparation of iron. I have, moreover, found it answer better than ammonia where there has been albuminuria.

Of all the local applications which have been recommended, that which gives the most relief is the fomentation by flannels, wrung out of a hot decoction of poppy-heads, assiduously applied. Flour freely dusted over the inflamed part has often a soothing, cooling effect in mild cases; but it is apt to form a crust, which subsequently adheres to and greatly irritates the inflamed part. Some surgeons recommend painting the affected region with collodion; an agent which not only serves to protect the skin, but to contract the congested vessels. To check the extension of the inflammation, boundary lines may be drawn on the sound skin with tincture of iodine, or the solid nitrate of silver.

With regard to the phlegmonous form of the disease, when suppuration has taken place, and pus has become infiltrated through the areolar tissue, long and free incisions ought to be made to give it exit. Moreover, in these cases, opiates, tonics, wine or brandy, and nourishing food, will have to be assiduously given.

For the cure of *infantile erysipelas*, the child's strength must be supported. If the mother's milk be deficient in quantity or quality, a vigorous wet-nurse should be obtained. Cordials, such as white wine whey, wine and water, &c., may be given to the youngest patient. In unhealthy children, the slightest wound will possibly cause the development of this disease. Two infants are reported by the Registrar-General to have died in England, from erysipelas following vaccination, during 1861.

8. THE PLAGUE.—This most malignant disease, though generally classed among the exanthemata, is said to be, strictly speaking, a continued contagious fever, bearing a striking resemblance to severe typhus. Indeed, among those practitioners who have had the opportunity of observing both diseases, the opinion is almost unanimous that the plague of the torrid is the typhus of the temperate climate. And, moreover, that what proves now to be only an epidemic of typhus would, some two centuries back, have been the plague.

The plague is now a disease exclusively of Eastern occurrence. It is not seen Europe in the present day, because the improved sanitary arrangements do not permit of typhus becoming intensified or fostered into plague. The sanitary condition of Egypt, however, is in many respects the same as it was a century ago. Dr. Mead, in assigning the reason why Cairo is the birthplace and cradle of the disorder, says: "Cairo is crowded with vast numbers of inhabitants, who live poorly, and nastily; the streets are narrow and close; the heat is stifling; a great canal passes through the city, which, at the overflowing of the Nile, is filled with water; on the decrease of the river, this canal is usually dried up, and the people throw into it all manner of filth, carrion, and offal: the stench which arises from this and the mud together is intolerably offensive, and from this source the plague, constantly springing up every year, preys upon the inhabitants, and is stopped only by the return of the Nile, the overflowing of which washes away this load of filth. In Ethiopia, the swarms of locusts are so prodigious that they sometimes cause a famine by devouring the fruits of the earth, and when they die create a pestilence by the putrefaction of their bodies. The effluvia which arise from this immense quantity of putrefying animal substance combined with so much heat and moisture, continually generate the plague in its intensest form; and the Egyptians of old were so sensible

w much the putrefaction of dead animals contributed towards breeding e plague, that they worshipped the bird Ibis from the services that it did devouring great numbers of serpents, which they observed injured by eir stench when dead, as much as by their bite when alive." *

The plague may be defined as a fatal contagious fever, which is due to e absorption of a poison that infects the blood. There is a period of cubation, probably varying from a few hours to three weeks. The rce of the poison is chiefly exerted on the cervical, axillary, inguinal, id mesenteric glands, as is shown in the production of buboes; on the in, causing carbuncles; and on the heart, liver, and spleen, giving rise great congestion and softening. The disease produces at once great stlessness; extreme and rapidly increasing exhaustion; an indescribable eling of oppression about the præcordia; fever of greater or less inten- y; a peculiar rolling of the eyes; nausea and vomiting; emaciation; eeding at the nose; swelling of the tongue; laborious breathing; dart- g pains in the axillæ and groins, with large buboes, curbuncles, &c.; nstipation; and sometimes suppression of urine. The powers of e soon give way, and death either ensues without a struggle in two or ree days, or is ushered in by an attack of convulsions. This intense rm of the disease is generally observed at the commencement of an idemic, when the deaths may be 90 per cent.; but after a time a milder hough still very dangerous) variety sets in. When recovery is going to ke place, profuse sweats occur about the fifth day.

At the time this fearful pestilence (described as the *Black Death* and e *Great Mortality*) desolated Europe, Asia, and Africa, in the fourteenth entury, the mortality must have been immense; for it has been computed hat Europe alone lost 25,000,000 of inhabitants by it. The last epidemic hich raged in England—the "Great Plague"—was in 1665, the year receding the great fire of London; when nearly one-third (68,596) of he population of the city perished from it. Supposing that this disease ad occurred in London in 1859, when the population was 2,774,338, and ad proved fatal in the same proportion, it would have been the cause of 00,000 deaths.

Most authorities now agree that the only place in which the plague riginates is Egypt, from whence it is imported into other countries. To revent the crew of a vessel with plague on board infecting the inhabitants f a tropical seaport town, recourse is still had to quarantine; which I elieve is generally of not less than twenty-one days' duration.

One attack probably affords only slight security against another. When n attendance upon any case the practitioner had better carefully avoid all ontact with the patient, or his clothes or bedding; while he should en- eavor so to time his visits as not to pay them when exhausted from want f food or rest.

The principal remedies appear to consist of emetics, mild aperients, and liaphoretics. If employed, however, these agents should be used guardedly nd with a skilful hand. Some authorities speak highly of the mineral cids; which on theoretical grounds would seem to be valuable. Quinine ometimes proves useful. Opium is often needed to allay irritation. Nour- shment and stimulants are to be resorted to as if the case were one of evere typhus. Disinfectants should be systematically used, free ventila- ion ought to be enforced, and the patient must be kept scrupulously clean. 'riction of the body with oil has also been recommended as a preventive neasure.

* Quoted from the Report on Quarantine. General Board of Health, p. 87. ndon, 1840.

PART III.

VENEREAL DISEASES.

I. BALANITIS.

BALANITIS [from *βάλανος* = the glans penis; with the terminal *-itis* from *ἴημι* = to impel, and signifying inflammation when added to the Greek name of an organ], or *external clap*, or *gonorrhœa præputialis*, consists of inflammation, with redness and patches of excoriation, about the glans penis and internal surface of the prepuce. Some practitioners call the affection balanitis when only the glans is affected, and balanoposthitis [*βάλανος*, *πόσθη* = the skin covering the glans, and the terminal *-itis*], when it is complicated with inflammation of the lining of the prepuce. This refinement, however, can scarcely be necessary, as the two conditions are very rarely seen separate.

Causes.—The presence of the prepuce predisposes to this disease by keeping up the delicacy of the mucous covering of the glans, and by permitting retention of the sebaceous secretions from the numerous glandulæ odoriferæ about the corona. Balanitis is not met with in men who have been circumcised.

The exciting cause of the inflammation is the application of some irritant,—as menstrual blood, the muco-purulent secretion of vaginitis, the matter of gonorrhœa, or acrid leucorrhœal discharges. Inattention to cleanliness will alone induce it, however, without any sexual intercourse. Secondary syphilitic discharges from the uterus have the property of producing balanitis of a specific nature, which may be followed by thickening of the prepuce and constitutional infection. Mr. Langston Parker very properly insists, that in these cases a positive inoculation takes place; and he gives examples of its occurrence.

A similar affection to balanitis, due to causes of a like kind, will now and then arise in the female. *Vulvitis* is most frequently met with in women about eighteen or twenty years of age. It has, however, been observed in young children, from the irritation of teething or of worms; or it sometimes sets in during the progress of one of the eruptive fevers (particularly scarlatina), especially where there has been a dread of cleanliness.

Symptoms.—Heat and itching, with a muco-purulent discharge, are the first indications. On denuding the glans, its surface (as well as that of the prepuce) will be found coated with discharge, or covered here and there with flakes of curd-like matter; beneath which are patches of redness and occasionally of excoriation. There is seldom any pain in passing water.

Sometimes the prepuce becomes œdematous; and either from this cause, or because the orifice is naturally very contracted, it may be impossible to

draw the foreskin back over the glans. This condition is known as *phimosis;* and so long as it exists the practitioner should give a guarded opinion as to the nature of the discharge, since the long narrow prepuce will perhaps be concealing a chancre. Moreover, a similar condition of the foreskin has sometimes led to the formation of an abscess, and even to gangrene. Occasionally simple balanitis gives rise to a sympathetic *bubo;* which, however, very rarely suppurates. Balanitis may also be complicated with gonorrhœa.

Treatment.—Simple balanitis is readily removed by cleanliness, a light touch with lunar caustic, or the application of any astringent wash. Painting the parts with the solution of subacetate of lead, or with a solution of nitrate of silver (two or three grains to half an ounce of distilled water), or the injection under the foreskin of an alum wash, often suffices. Sometimes the mere washing and drying of the part, twice in the twenty-four hours, with the application of a fine layer of cotton-wool between the glans and prepuce, will quickly effect a cure.

Where the disease has induced phimosis, cold bread-and-water poultices should be applied, or the penis can advantageously be enveloped in lint kept wet with the dilute solution of subacetate of lead. Such remedies will soon remove all swelling, and permit of retraction of the foreskin. But when this condition is congenital, and the muco-purulent discharge continues in spite of the proper use of injections, it will be desirable to perform circumcision; or if this be objected to, the prepuce ought to be slit up. Where, however, there is an insuperable dread of any operation, the opening of the foreskin may be stretched by introducing and separating the blades of a fine pair of dressing-forceps, or by using a sponge-tent (F. 426) for a few hours. As soon as the glans has been uncovered and the remedy applied, the foreskin should always be drawn forwards again; since, if this be neglected, paraphimosis will probably ensue, the constriction leading to great swelling with pain about the glans.

II. GONORRHŒA.

Gonorrhœa [from *Γωνὴ* = the semen + *ῥέω* = to flow, hence improperly applied to the disease under consideration], or *blennorrhagia* [*βλέννα* = mucus or slime + *ῥήγνυμι* = to burst forth], or *blennorrhœa* [*βλέννα* + *ῥέω*], or vulgarly the *clap*, is a specific inflammation, more or less acute, of one or more parts of the genito-urinary passages, accompanied by a discharge. It demands notice under three heads: As it occurs in an acute form in the male, in a chronic form (gleet), and as it affects the female.

1. **GONORRHŒA IN THE MALE.**—This disease is an inflammation (a specific urethritis) of the mucous membrane lining the urethra—generally of the anterior portion; and it is accompanied by the flow of a highly contagious purulent or muco-purulent fluid.

Gonorrhœa has been recognized as an "uncleanness" from the earliest times. It was in reference to this disorder (as we learn from the 15th chapter of Leviticus) that Moses and Aaron were commanded to speak to the children of Israel: "When any man hath a running issue out of his flesh, because of his issue he is unclean."

Causes.—The common cause is the application of gonorrhœal matter

during sexual intercourse. Although the existence of this animal poison has only been inferred from the effects, yet there can be but little doubt that there is such a poison of a special nature, and that it does not arise simply from indiscriminate sexual intercourse. Though at first the morbid material seems to produce only a local disease, yet it certainly infects the system, manifesting its power particularly on the fibrous tissues; for only on this supposition can the occurrence of such a disease as gonorrhœal rheumatism be explained.

At the same time it must be remembered that the application of many different kinds of irritants will produce a disease closely resembling the clap. These non-specific inflammations are attended with a muco-purulent discharge; but the latter is perhaps, as a general rule, thinner and less abundant than that which is poured out in true gonorrhœa. They may arise from connection with a woman who is free from any specific disease. A female suffering from severe leucorrhœa, inflammation of the vagina, simple excoriation of the lips of the uterus, or from malignant ulceration of the cervix, can communicate a discharge having the characters of a gonorrhœa. She may do the same if too indolent to wash herself, or if she permit intercourse during menstruation. And if suffering from an acrid purulent discharge, owing to constitutional syphilis affecting the uterus, she is very likely to irritate, and perhaps to inoculate, whoever has connection with her. Moreover, it is not unlikely that unduly frequent intercourse, between parties quite healthy, may beget simple inflammation. While it is quite possible for a prostitute to have true gonorrhœal matter left in her vagina that will infect her next visitor, but which exerts no unfavorable influence upon the insensible mucous membrane of her own genital organs.

A spurious gonorrhœa now and then arises without any sexual congress. Thus, it is sometimes met with in young children, owing to the irritation of worms in the rectum or of teething. So it can be induced in adults by masturbation, habitual costiveness, the immoderate use of alcoholic stimulants, or by calculi in the bladder or ureters. I have even heard a credulous surgeon suggest that making water in the cold night air might induce urethritis, just as exposure to wet may cause common catarrh.

Symptoms.—Between the date of exposure to the source of contagion and the appearance of the symptoms, there is an interval varying from twenty-four hours to five or six days. Probably three days may be taken as the average time of incubation. The affection then begins with heat and itching about the glans, a puffiness and redness of the urethral orifice, and shortly afterwards a kind of sanious or glairy discharge. The latter soon increases in quantity, becomes muco-purulent, and has a greenish or yellowish tinge. On passing water a burning pain or scalding is experienced, this symptom being most acute in first attacks. And then there may be pain in the groins, a thickening with tenderness of the urethra, tenesmus, irritability of the bladder, as well as a sense of weight and dragging in the testicles; while occasionally there is feverishness, with more or less severe constitutional disturbance.

When the disease is located in the fossa navicularis (that portion of the urethra within the glans penis) the pain of micturition is confined to this part, and the discharge is comparatively small in quantity; when in the spongy portion, extending from the glans to the bulb, chordee is frequent, and the discharge abundant; when the bulbous portion is affected, there is pain in the perineum, chordee, and considerable irritability of the bladder; while where the membranous part has to bear the brunt of the disease there is most severe pain in the perineum, a frequent desire to micturate, tenesmus, and perhaps swelling of the prostate and testicles. In all cases

the rule is, that the symptoms diminish between the tenth and twentieth days; while shortly afterwards the inflammation either subsides entirely, or it takes on a chronic character, and a gleet becomes established.

Diagnosis.—The only disease with which it is important that a gonorrhœa should not be confounded, is a primary sore in the urethra. In the latter, the ulcer will frequently be visible on everting the edges of the urethra; while the discharge is found to be small in quantity, sanious, and bloody. On examining the urethra, a circumscribed and painful induration can generally be felt.

Complications.—The most frequent is *chordee*, in which there is erection with a bending of the penis into the form of a bow. This annoying condition is said to be due to inflammation of the corpus spongiosum, impeding expansion of its erectile tissue; but the explanation is not very satisfactory. Voluptuous dreams, warmth, highly spiced or seasoned food, and alcoholic stimulants are likely to excite it. When the chordee is severe, it may cause rupture of one or more small vessels, so that *hemorrhage from the urethra* results. *Balanitis*, perhaps with œdema of the prepuce, may occur from the irritation of the discharge; this being most common when there is phimosis. *Sympathetic bubo* will perhaps take place; the inguinal glands, however, rarely suppurating. An *abscess* occasionally forms, either in the urethra, or in the perineum—perhaps owing to inflammation of Cowper's glands. *Prostatitis* and *cystitis* are now and then induced, very probably in consequence of an extension (not a metastasis) of the inflammatory action. So, in the same way, *epididymitis* is not unfrequently set up; the inflammation being confined to the epididymis, though the whole testicle looks swollen, perhaps from an accumulation of serum in the tunica vaginalis. And lastly, *gonorrhœal rheumatism*—sometimes accompanied by *gonorrhœal ophthalmia*—may supervene; setting in either during the acute stage, or in the decline of the disease, or after the discharge has ceased. With regard to gonorrhœal conjunctivitis being always the result of the direct application of the virus to the mucous covering of the eyeball, I can only say that I am very skeptical. That this kind of ophthalmia is sometimes constitutional, like the rheumatism, I am strongly inclined to believe.

Treatment.—In the choice of remedies something must depend upon the stage at which the disorder is seen. But the object of the practitioner should always be to stop permanently the discharge,—which indeed is synonymous with effecting a cure.

No one remedy can be strongly recommended—there is no specific. On the other hand, a caution is necessary with regard to two drugs which are still very frequently employed, are generally inefficient, are very nauseous, and which often do much mischief to the stomach. These medicines are balsam of copaiba and cubeb pepper. Without saying that they are never to be prescribed, yet I would guard their administration with so many "ifs," as almost to amount to a prohibition. Thus, if the disease be in an early stage, and the inflammatory symptoms urgent, they are inadmissible; if there is constitutional disturbance, they are to be avoided; and so also, if the bladder be irritable, if there be chordee, if there be a sense of dragging weight in the testicles, if there be a tendency to skin eruptions, or if nausea is readily induced. With regard to the use of antimony, mercury, and turpentine, nothing need be said; inasmuch as no educated practitioner would now think of attempting to subdue a gonorrhœa by them.

There are some few cases where, if the disease be seen almost at the outset, it may be checked by what is called the *abortive* treatment. This consists essentially in the injection, by the practitioner, directly after the

solution of nitrate of silver (from 5
water : the tube of the syringe being
having a length of an inch and a half.
is to be taken; there is to
stimulating food and drink must be
the patient may employ an injec-
sulphate of lead, or five grains of
If there be much pain, the penis
while a suppository of two
after the bowels have
successful, the discharge will
quality and consistence at the end of
then a cure can possibly be effected
using the use of the lead or zinc injec-
hours between each use of the syringe),
by the avoidance of much exercise.
merely the disadvantage of being ap-
of the disease, but it is liable to lead
cases it has induced very violent inflam-
in abscess, or in stricture; it has caused
instances it has even produced peritonitis.
sible to resort to the abortive treatment under
and when a rapid cure is demanded at all
never be practiced without warning the patient of
and the necessity for his strict attention to the rules

class of cases the remedies which promise most are,—
stimulating diet, as much rest as attention to busi-
mild injections. While using the latter, one of the
be given. Mr. Milton speaks strongly of the efficacy
with fifty grains of acetate of potash, thirty minims of
and one ounce of water; which is to be taken twice
pain be considerable, warm baths will afford much
are jalap, compound scammony powder, the
, or the effervescent citro-tartrate of soda. In
fish, mutton, vegetables, eggs, tea, and milk may
to forbid all salt meats, soups, "made dishes,"
and spirits. It is sometimes impossible for the
and a little sherry, or claret, with water or
injurious beverage of the kind. Tobacco,
snuff, may possibly not prove injurious, but it
As regards the injection, some prefer the
the chloride of zinc, some the nitrate of
which has appeared to me to be generally
drachm of the solution of subacetate
should be employed every eight or
its effect, as it will do in a few days,
ounce of water), or the nitrate of silver
substituted.
combination of camphor and bella-
grains of the former, with half or two-
at bedtime, will generally succeed;
mattress, without too much covering.
cotton can be fastened over the
against the occurrence of testitis, a

suspensory bandage should be worn; more particularly if the patient is obliged to walk much. For the scalding, bathing the penis with water as hot as can be borne, and drinking freely of weak tea or plain water, may be recommended. Hemorrhage from the urethra will easily be checked by the application of cold, or of two or three grains of tannic acid in a little cocoa butter, or by pressure. If there be retention of urine, a catheter had better not be used until a hot bath and a dose of opium have failed to remove the obstruction. And then any other complications which may arise must be remedied according to the rules which ordinarily guide the practitioner in the management of rheumatism, ophthalmia, testitis, prostatitis, &c.

The practitioner is occasionally asked how the danger of contagion may be obviated? There are perhaps some who would refuse to answer the question, or would reply in the words of John Sintelaer,—"The only preservative against catching the venereal, is to keep the finger out of the red-hot frying-pan." But it seems better to admit that there is no specific for this purpose; and that the only precautions which can be taken are, not to prolong the congress, to pass water immediately afterwards, and to bathe the penis thoroughly.

2. **CHRONIC GONORRHŒA, OR GLEET.**—This disease consists of a mild chronic inflammation of some portion of the urethra. It is attended with a slight discharge; but is unaccompanied by scalding or pain during micturition. It is not unfrequently the sequel to an acute attack of gonorrhœa.

A gleet may depend upon many circumstances, but in a large number of cases it would seem that the urethra is appreciably affected. In other words, on passing a bougie one or more portions of the mucous membrane of this canal will be found irritable and somewhat contracted, perhaps in a condition resembling that observed in granular conjunctivitis; or there may be detected a permanent stricture, from thickening of the mucous membrane or from the effusion of coagulable lymph into the connective tissue around the urethra. Irritation of the prostate, or of the neck of the bladder, will perhaps be the cause of the discharge in another class of cases; while it can also be kept up by constitutional debility arising from debauchery and malpractices. The discharge is generally transparent and of a mucous character; but on a minute examination it will be seen to contain pus-corpuscles with scales of epithelium. Where there is irritation of the prostate or of the neck of the bladder, the patient will be troubled with oft-repeated calls to pass water; while the urine will be found on standing to deposit more or less tenacious mucus. Pain in the perineum is frequently complained of, sometimes with irritation at the end of the penis.

Unless properly treated, a gleet or blennorrhœa may continue for many months, occasionally ceasing for a few days, and then returning again and again, much to the patient's disgust. It is, therefore, important to discover the cause of the discharge, as only on the removal of this can a permanent cure be looked for. In all cases a temperate mode of life is necessary, and care should be taken that the digestive organs act efficiently. Then, if there be an organic stricture, this must be dilated, the discharge generally ceasing as the effused lymph becomes absorbed. If patches of the urethra are contracted and oversensitive, the use of a bougie smeared with some astringent ointment, twice or thrice a week, will be needed. The nature of the ointment should vary with the irritability of the urethra, as it is necessary to cause moderate smarting. Equal parts of the mercurial and

may suffice; or the ointment of
eight parts of lard, will often
from twenty to sixty grains of
needed. The bougie ought
urethra for from ten to forty
nitrate of silver, applied by
recommended. Moreover, it
bougie is being thus employed
infection, night and morning,
of the officinal solution to
ce or two grains to the ounce).
state or neck of the bladder,
increase the mischief. The treat-
of this irritation; the best rem-
belladonna suppositories at night
infusion of bearberry (uva ursi),
certain troublesome cases the
more speedily than other rem-
surface of the urethra and the
seful. By Mr. Milton and some
penis seem to be justly regarded

constitutional debility, tonics will
made with phosphoric acid, nux
F. 103), or the ammonia iron-
F. 400), may be ordered. There
tonics which is generally over-
desire for sexual intercourse; this
fact that obstinate gleets have
is no doubt true that the thin
a healthy female, but it must be
wine, &c., may quickly render
at least a possibility of infection.
a gleet continues obstinate in an
cod-liver oil, sea-bathing, and a nour-
the system is gouty, colchicum can
rheumatic, iodide of potassium may
such remedies are being employed,
auxiliaries.

FEMALE.—This disease is of a somewhat
occurs in man. It consists of acute
urethra, or vagina, or canal of the
more or less copious muco-purulent
condition of the parts nor in the symp-
relatively to distinguish an inflamma-
the most chaste female, from that
discharge of a clap. Yet it is impossible
true gonorrhœa. Dr. Henry Bennet,
existence of a contagious and a non-con-
bound to confess that the only dif-
is that vaginitis apparently con-
—appears to be more acute than
greater quantity of pus secreted, greater
the mucous membrane, that the inflam-

matory action has a greater tendency to spread to the urethra, and that it is very much more intractable to treatment. These conditions, merely implying degrees of inflammatory violence, do not evidently constitute a distinction as to morbific characteristics. It is, however, I repeat, a remarkable fact that simple vaginitis in the immoral portion of the population should usually assume the severer form of the disease, and be readily communicated; whereas, with the moral part of the community it should usually affect the milder form and be seldom communicated."* My own experience quite confirms this opinion, and is perhaps the more valuable because it has been drawn from a different class of patients to that seen by Dr. Bennet. For, whereas he has had great opportunities of observing uterine and vaginal disease in the higher classes of society, my views have been derived from a very large practice amongst hospital patients. And this may certainly be said, that I have never yet seen any woman suffering from such a train of symptoms that I could go into a court of law and assert that she was affected with gonorrhœa, in the meaning commonly attached to this term. There have undoubtedly been many instances where I have thought such was the case—where there has existed a discharge from the meatus urinarius and vagina, of a thick muco-purulent matter; but a very different conclusion might have been come to by an *intelligent* jury, had I been submitted to a sharp cross-examination.

This subject will again be brought under the reader's notice in the section on the Diseases of the Female Genital Organs. But it may here be mentioned that when, in my practice, the diagnosis has been a specific gonorrhœa, the treatment has been as follows: In the acute stage, prolonged hot hip-baths; with the injection of large quantities of warm water every eight or twelve hours, by means of a siphon syringe. Mild aperients, rest, and low diet have also been needed. If there have been an abscess in either labium, as is not uncommonly the case, it has been opened. Directly the symptoms have moderated, astringent injections (F. 425) have been freely employed; and then when the discharge, in diminished quantity, has constituted the sole remaining symptom, a medicated pessary (one containing tannin or acetate of lead, see F. 423) has been used every night, or for two or three nights in the week. The cervix uteri has also been examined by the speculum, and any inflammatory or excoriated patch freely touched with nitrate of silver. It need scarcely be added that until an apparently complete cure has been effected, sexual intercourse has been strictly prohibited; for where this rule has been disregarded, the treatment has proved of little value.

III. NON-SPECIFIC EXCORIATIONS, VEGETATIONS, ETC.

To prevent mistakes in the diagnosis and treatment of venereal diseases, it is necessary to give a brief description of certain non-specific affections, which sometimes follow sexual intercourse, and hence are apt to be regarded with suspicion by the public. The affections thus grouped together are, vegetations, excoriations, herpes præputialis, and eczema.

1. VEGETATIONS, OR WARTS.—These growths consist of hypertrophied papillæ covered with epithelium. They form around the corona

* A Practical Treatise on Inflammation of the Uterus, &c. Fourth Edition, p. 229. London, 1861.

glandis and on the frænum; either as the result of balanitis or of gonorrhœa, or independently of these diseases, from not attending to cleanliness. They also occur in females, owing to any irritating discharge; and are found in clusters about the perineum, the vaginal labia, &c. They must not be confounded with mucous tubercles or condylomata, which are formed of raised patches of skin, are of a flattened irregular shape, red and moist on the surface, and are generally covered with a dirty-white secretion. These condylomata are usually accompanied also by other secondary symptoms, or even by primary sores.

The *treatment* of warts is simple. Occasionally great cleanliness and the use of an astringent wash will cure them when they are small. Frequently they are dry and horny; but if any moisture exudes from their surfaces it will be well to cover them with a fine layer of cotton-wool, or to dust them with the oxide of zinc. When these means fail or are not applicable, the growths should be removed with the curved scissors, so as not merely to cut away the projecting portions, but the whole of the enlarged papillæ. Any bleeding which results can be checked by cold, or by pressing a pellet of cotton-wool on the cut surface, or by applying a drop of the solution of perchloride of iron. Sometimes, however, this treatment will be thought too violent, and then the solid nitrate of silver must be rubbed into the structure, the surrounding parts being covered with olive oil; or in the same way we may use the glacial acetic acid, or the dried sulphate of zinc, or the acid solution of nitrate of mercury, or the glycerin of carbolic acid. Without subsequent ablution once or twice daily, the vegetations will probably be reproduced.

2. EXCORIATIONS, &c.—An abrasion of the epithelium or epidermis is often met with as the result of sexual intercourse. There is no ulceration; but we find either an excoriation or a slight rent or tear near the frænum. Men with a delicate skin and a long narrow prepuce sometimes suffer in this way after every connection. Free ablution with tepid or cold water will soon give relief; but a permanent cure can occasionally only be effected by circumcision. If, by chance, an abrasion should fail to heal, the general health will probably be found depressed; and then a mild astringent wash had better be ordered, while bark with some mineral acid is given internally. It must be remembered that an excoriation, at the time of its occurrence or subsequently, may have become inoculated with chancre-virus. There will be some difficulty in deciding whether this has happened, at all events until after the lapse of thirty-six or forty-eight hours from the occurrence.

Where there is a preternaturally short frænum I have sometimes seen this structure partially torn through, causing pain and occasionally troublesome hemorrhage. The best plan is to divide the frænum completely. If the artery bleed much, its orifice can usually be obliterated by sharply nipping the end of the vessel with a pair of forceps; but this failing, a ligature should be applied.

3. HERPES PRÆPUTIALIS.—Clusters of herpetic vesicles frequently form on the integument of the prepuce; being accompanied with troublesome itching and more or less burning pain. The vesicles either desiccate, or their heads are rubbed off; and then a thin crust remains, which in two or three days falls away, leaving a red unbroken surface. Herpetic eruptions are rather more troublesome when situated on the inner surface of the prepuce. The milky-looking contents of the vesicles become purulent about the third day; while the cells coalesce into a slight ulcer, which will possi-

bly assume a very suspicious appearance if it be improperly irritated with caustic.

The usual history of these cases is that the patient, after dining out, has had intercourse with a loose woman. The itching and heat soon remind him of his indiscretion, and he hurries off to his physician. Probably the dinner has had more to do with his complaint than the subsequent weakness. However this may be, a seidlitz powder, or a dose of the solution of carbonate of magnesia, will do good; while the rash runs its course and soon gets well.

4. ECZEMA.—This disease will be more completely treated of in a subsequent page. Nevertheless it may be mentioned here, that it sometimes occurs on the glans, or inner surface of the prepuce, or low down on the penis, or on the scrotum, from inattention to the proper use of water. It is not uncommon in prostitutes, the rash being generally situated about the labia and perineum.

The minute papules or vesicles are attended with itching, heat, and redness; and then the sero-purulent exudation forms small scales with cracks in them. Sometimes the scratching resorted to for relieving the itching caused by the pediculus pubis or crab-louse (for an account of which see the section on Diseases of the Appendages of the Skin), produces scabs which may be mistaken for eczema. An examination of the part with a lens will readily expose the blunder.

Bathing and washing the eczematous patches with the diluted solution of subacetate of lead will generally effect a cure. But if the eruption be chronic, a mild course of arsenic may very likely be needed.

IV. PRIMARY SYPHILIS.

Primary syphilis* occurs as a specific ulcer or chancre, the ulcer appearing on the part to which the virus has been directly applied. According to many surgeons there must be some abrasion or breach of surface for inoculation to take place; while others believe that the mere application of the poison to the delicate mucous membrane of the sexual organs will suffice. In the present day all practitioners allow that gonorrhœa and syphilis are essentially distinct diseases, due to poisons altogether different in their nature. Time never yet matured a clap to pox, though Pope says it will at last do so. Whether there are also varieties of the syphilitic virus has been strongly contested; the question as to the unity or duality of the poison having led to the expression of many opinions, without producing any convincing argument decisive of the question. Certainly, and this is the really important point, there are two distinct classes of venereal sores, viz., the infecting, and the non-infecting. In the former class there is only the true syphilitic or hard chancre; in the latter we find the soft chancre, with the phagedænic and the gangrenous sores. Thus, four kinds of ulcers may result from impure sexual intercourse. Occasionally these varieties of action succeed each other,—that is to say, the patient receives the virus of both the infecting and non-infecting sores, both of which may show them-

* Several derivations have been given of the word syphilis; but, as Dr. Mayne states, none seems better than that of Blancardus—$\Sigma\grave{\upsilon}\nu$ = together + $\phi\iota\lambda\acute{\epsilon}\omega$ = to love.

selves together in the same part, one before the other, conformably with the fact that the first-named have a somewhat long period of incubation. According to Mr. Henry Lee,*—

The first form of ulcer is the *indurated, hard, Hunterian, infecting, or true chancre.* The ulcer yields only an insignificant quantity of discharge, made up of molecular débris without any pus. It is accompanied by the adhesive inflammation, "and produces a peculiar chronic enlargement of the inguinal glands, which does not involve the skin or the cellular membrane. This variety is followed by secondary symptoms, and requires both in its primary and secondary forms mercurial treatment." It is an exceptional occurrence for this disease to happen twice in the same individual.

The second is the *simple, soft, non-indurated chancre.* It is accompanied by suppurative inflammation. The secretion from the sore contains pus-cells. It does not necessarily affect the inguinal glands, and is a local disease which is neither accompanied nor followed by secondary symptoms. Hence only local treatment is needed. When a bubo forms it will be of the suppurating kind, and not indurated as happens with the infecting sore.

The third is the *phagedænic sore.* It is accompanied by ulcerative inflammation. "It produces suppuration, generally of one inguinal gland only, which yields an inoculable secretion. It is not followed by constitutional syphilis, and may be treated by local means."

The fourth is the *sloughing sore*, or *gangrenous phagedæna.* It "is accompanied by mortification. It does not affect the inguinal glands, is not followed by constitutional infection, and requires only local treatment."

The fact must not be forgotten that primary venereal sores sometimes have their seat in the urethra, when the discharge is apt to be mistaken for that of a gonorrhœa. Hence (as before advised), in all cases of the latter disease the urethra should be pressed between the fingers so as to detect any induration, if an ulcer be present; while the lips of the meatus also ought to be separated, so that if a sore exist it may be properly treated.

Chancres in the female are most commonly situated on the labia majora, on the nymphæ, on the walls of the vagina, or in the folds about the clitoris. In very rare cases they have been found on the lips of the uterus, or even just within the canal of the cervix uteri. Speaking generally, these ulcers give rise to less local distress than is the case with the opposite sex; so that where there is a neglect of personal cleanliness, their presence may be overlooked for several days. And it is an important point to recollect, that the infecting chancre in women is seldom accompanied with induration.

1. **THE INDURATED CHANCRE.**—If we take a typical example of the *indurated, Hunterian, true,* or *infecting chancre,* we shall find that this disease consists of a superficial circumscribed abrasion or sore situated on an indurated base. The loss of substance is slight. The surface appears glossy, or as if covered with a thin coating of gum. There is no inflammatory areola, but the edges terminate abruptly; so that the sore looks somewhat cup-shaped, from the elevation of its margin.

The disease does not generally commence until several days have elapsed from the date of exposure to infection. Some authorities deny, while others assert (and I agree with them) that there is a period of incubation, varying from a fortnight to four or even six weeks. During this interval nothing suspicious may be observed: still, the poison unseen is in action. Then, a

* A System of Surgery. Edited by T. Holmes, M.A., &c. Vol. i, p. 461. London, 1860.

small red pimple appears; or a slight abrasion or fissure assumes an unhealthy appearance; or an indurated tubercle is found without loss of tissue. Generally the cuticle very soon gives way, and a circular excavated sore results. This gradually extends for a few days, successive fine layers of the surface perishing and being thrown off. The secretion from it is small in quantity, consisting of a little serum and lymph-globules, with epithelial débris; but the character of this discharge is readily altered, and the amount increased, by the application of caustic or any irritant.

The characteristic feature of these sores is the induration of their margins and bases, from the adhesive inflammation giving rise to effusion of lymph. Sometimes this induration is superficial, and not thicker than a piece of parchment; but, as Mr. Lee points out, it is only entirely absent when the sore has its seat on the upper and central portion of the glans penis. In this case the sore is more like an abrasion than an ulcer; and "although it does not become indurated itself, it may be followed by induration of neighboring parts, which have not themselves ulcerated." Most commonly the infecting chancre is solitary; two or more distinct sores occurring simultaneously on the same patient not being met with more frequently than in one case out of five or six.

When the disease has arrived at the stage of induration—in other words, when the system has become appreciably altered by the specific action of the virus, the patient cannot be inoculated with the secretion from his sore. Out of 99 cases of indurated chancre in which inoculation was attempted by Ricord, a characteristic pustule was only produced once. And even in this case inoculation was performed at an early period, while the chancre was increasing in size.

As the specific induration of the chancre appears, the absorbent glands in direct connection with the lymphatics of the part become affected. It is an exceptional occurrence for only one inguinal gland to suffer. Generally two or more become indurated; being felt under the skin, like foreign bodies, the size of almond-shells. Hence Mr. H. Lee describes these tumors as *amygdaloid indolent buboes*. They are very chronic, painless, and hard; this hardness remaining even after all induration about the original sore has disappeared, until indeed the disease is thoroughly cured. They only suppurate if accidentally irritated to the extent of producing inflammation; thus differing widely from the bubo which accompanies the non-infecting chancre.

Cases of a mixed form of chancre are occasionally met with. In these there has been a twofold inoculation. Thus it has been shown experimentally by M. Lindwurm that if the secretion from an infecting sore be inoculated on a soft chancre, this latter will become an indurated sore, and will be followed by secondary symptoms.

In the *treatment* of infecting chancre it must be remembered that we have a constitutional affection to deal with. We ought carefully to distinguish between effecting an apparent and a perfect cure; only resting satisfied with the latter, so that the general system may not subsequently suffer. If any blood-contamination be left, plastic matter will afterwards be effused upon the iris, or on the bones, or in the muscles or areolar tissue, or in the substance of internal organs, giving rise to what are known as secondary and tertiary symptoms.

Local applications are of comparatively little use. The healing of the sore may perhaps be facilitated by using mercurial ointment to it, or by dressing it with black wash—calomel combined with a little mucilage and lime-water. Supposing the part to which the syphilitic virus has been applied can be destroyed with caustic within a few hours (some say "four

days") from the application of the poison—before there has been time for systemic contamination, then a permanent cure may be effected by such treatment; but the opportunity of doing this is very rarely offered to the practitioner. As soon as there is induration, it is certain that the virus has become disseminated. Then constitutional remedies are needed, and must be persevered with until all hardness at the seat of inoculation or of the inguinal glands has entirely disappeared. To avoid useless repetition, these remedies will be treated of in the section on Constitutional Syphilis; but it may be mentioned that I believe mercury to be the only agent which has the power of completely destroying the syphilitic virus. And were I asked to give any proof of the truth of this view, I would point to those cases of constitutional syphilis which we meet with in married women. A female so affected may conceive again and again, and as often as she does so the gestation ends in abortion or in the birth of a dead child. She takes drugs of every kind, except that one especially needed, without the slightest benefit. But let her, and the husband if necessary, undergo a judicious mercurial course, and the most direct evidence will be afforded that the real antidote or remedy has been employed. To my mind it appears, that the cure of ague by quinine is not more certain than that of true syphilis by mercury.

2. THE NON-INDURATED CHANCRE.—This variety of venereal disease, much more common than the infecting chancre, consists of a suppurating sore; which is known as a *simple, soft,* or *non-indurated chancre.* As it is often produced by the inoculation of an abrasion or fissure, so it does not generally commence with a pimple or pustule. There is only a very short period of incubation. Within three days at the outside of the inoculation, the symptoms show themselves. Frequently, when the patient first comes under observation, there are two or more circular sores; these ulcers having spongy bases, and well-defined edges, which look as sharp as if portions of the healthy tissue had been punched out. The ulcer gradually extends for a time; its surface gets covered with indolent granulations; and the comparatively abundant secretion from it becomes purulent, within five or six days from the time of contagion. This secretion is auto-inoculable. The absorbent vessels and glands do not necessarily become affected; but if lymphatic absorption does occur, then a suppurating bubo will follow. This variety of chancre is a local disease, which will heal spontaneously in from three to six weeks. It frequently leaves a scar but no induration.

When the disease extends below the mucous membrane so as to involve the connective tissue, it spreads more rapidly, and the inflammation causes a certain amount of induration. But even here, the purulent discharge will suffice to distinguish this *phlegmonoid suppurating sore* from the infecting chancre. On minutely examining the secretion it will be found to consist of well-formed pus-globules.

If the sore be seen within five days from the application of the poison, effective cauterization will cure it. For this purpose, nitrate of silver will hardly suffice, since it is too irritating without being sufficiently destructive. The affected part must be destroyed with nitric acid, or potassa fusa, or with the acid solution of nitrate of mercury; great care being taken to limit the action of these powerful escharotics. In other cases, simple dressing of the sore with an astringent lotion may hasten cicatrization. If there be a suppurating bubo, it should be freely opened. At the same time, quinine with ferruginous tonics, nourishing food, and exercise in the open air, will prove useful.

3. THE PHAGEDÆNIC SORE.—In this form of venereal inflammation we generally find a small and irritable and ragged ulcer, secreting unhealthy pus. Its peculiar character is the tendency it has to spread irregularly. When it extends from several points, in the form of portions of circles, it is known as the *serpiginous* chancre. Whether it spreads in this manner or simply in a circular form, an inguinal gland soon becomes swollen and very tender, so that the patient walks somewhat lamely; there is generally a rigor, with constitutional disturbance; and relief is not obtained until after suppuration has taken place, and the pus been discharged. The destruction of the affected gland and the skin over it, gives rise to a troublesome unhealthy ulcer in the groin. In some instances a venereal sore is phagedænic from the commencement; while in others this eroding character is engrafted, as it were, upon one of the other varieties. The secretion from such a sore is inoculable upon the patient.

The *treatment* of these cases will have to be mostly palliative. Fomentations and poultices, with full doses of opium internally, are generally very beneficial. As a rule, caustics and irritants are hurtful. In one very obstinate case of serpiginous chancre which was under my care, all remedies were useless until they were employed in conjunction with mercurial fumigation (F. 131). Where there is general debility, bark and nitric acid, or some ferruginous tonic with quinine, will be indicated. If there be much inflammatory action, large doses of iodide of potassium with sarsaparilla can usually control it. Cod-liver oil is serviceable. The patient had better keep his bed. The diet ought to be nourishing, without stimulants.

4. THE SLOUGHING SORE.—In these cases we have a venereal sore in combination with destructive gangrenous inflammation. Hence the disease is known as the *sloughing sore* or *gangrenous phagedæna*. Sometimes the death of the tissue to which the virus has been applied is so complete that the poison is destroyed by the same action, as if by a powerful caustic; so that when the slough is cast off a simple sore alone remains. The general health is always impaired, and occasionally to a very marked degree. Although this variety of sore is so severe that now and then the whole prepuce gets destroyed, with perhaps even a portion of the glans, yet when cicatrization commences it generally goes on quickly. The inguinal glands do not become affected, neither do secondary symptoms follow.

The *treatment* is much the same as that required in the phagedænic chancre. Stimulants and very nourishing food will be needed; while the pain must be relieved by large doses of opium. The use of mercury is inadmissible. The patient ought to be confined to bed in a well-ventilated room.

When this disease occurs in poor enfeebled prostitutes, it sometimes proves very severe. The whole of the labia and nymphæ may slough away, and death ensue—perhaps from hemorrhage. Happily, such cases are very rarely met with in the present day.

V. BUBO.

A bubo consists either of a simple or of a specific inflammatory enlargement of a lymphatic vessel, or of one of the glands in connection with such vessel. The superficial glands are alone affected,—those directly connected with the seat of irritation by the lymphatic vessels. The poison, when

there is one, seems to be arrested in these glands, and does not pass to the deeper series. Women very rarely suffer from this affection.

There are several varieties of bubo:

1. *Simple Sympathetic Bubo.*—Whatever causes lymphatic irritation can give rise to simple inflammatory adenitis. Hence it may occur in balanitis, or in gonorrhœa, or from the irritation of any kind of sore on the penis, or merely from excessive sexual intercourse. Perhaps strumous subjects are more liable to this bubo than others. Frequently, not only the gland itself but the lymphatic vessel leading to it is found enlarged and indurated, feeling like a piece of whipcord. The inflammation may end in resolution; or by its severity suppuration may be established. In the latter case, a simple abscess results; the pus from which is healthy and free from any specific quality. After its evacuation, healing is seldom long delayed. The great object of *treatment* must be to obtain resolution, and perfect rest is more likely to accomplish this than anything else. Warm bathing will be useful. Tonics and cod-liver oil can often be advantageously prescribed. When suppuration does take place, a free opening ought to be made at the lowest part of the bubo, in order to avoid the burrowing of the pus in the surrounding connective tissue.

2. *Primary Bubo.*—In this case a bubo is said to form from the direct absorption of syphilitic matter, without the occurrence of any chancre or sore on the penis. The pus produced by the suppuration of a gland so affected will give rise to venereal sores when inoculation with it is practiced. This *bubon d'emblée*, as it is designated by the French surgeons, who first described it, is so rarely met with that many practitioners of experience doubt its existence.

3. *Amygdaloid Indolent Bubo.*—This form of bubo has been already described in the section on Infecting Sores. It generally comes on simultaneously with the occurrence of induration in the chancre; and as the latter is indolent, so are the buboes which almost necessarily accompany it. Suppuration only occurs from some accidental cause; but should it take place, the pus is not inoculable upon the patient. Usually the whole chain of superficial glands, in the groin corresponding to the side of the penis on which the sore is seated, is indurated. These buboes are the least painful and troublesome locally, but the most important as regards the patient's general health; since they are a proof of constitutional infection.

4. *Virulent or Inoculable Bubo.*—The absorption of the venereal virus from a soft, or from a phagedænic chancre, produces this variety of bubo. In the greater number of cases it happens towards the end of the second week from the first appearance of the disease. The poison will not only affect the first gland to which it is conveyed, but in its passage may also inoculate the lymphatic vessel. The gland, and perhaps the vessel, then suppurate; while when the abscess opens, we find its walls forming a venereal sore, the pus from which is auto-inoculable.

The attempt to prevent suppuration will be useless. As soon as pus has formed it should be evacuated by a free incision. If the skin be thin and undermined, it may be sometimes better to make an opening by means of potassa fusa rather than by the knife. Subsequently, soothing dressings, and frequent syringing with warm water, will usually be more useful than severer measures. If any sinuses form, they are to be laid open. Quinine and iron, good nourishing food, and pure air, will be needful.

VI. CONSTITUTIONAL SYPHILIS.

There is probably no poison which has a more powerful yet insidious influence in deteriorating the constitution than the syphilitic. And not only does it render the sufferer a confirmed invalid for a long time, but it slowly works its dire effects upon several of the most important tissues of the body. Many cases of chronic ill-health are due to it; while it is often the cause of obscure diseases of the vital organs, affections of the bones, rebellious ulcers of the cutaneous or mucous surfaces, troublesome skin eruptions, headaches and neuralgic pains, impotence or sterility, abortion, and the death of the fœtus in utero.

When syphilis became distinctly recognized in Europe about 1483, we learn from the description of the symptoms that the disease was more severe and ran a more rapid course than it does in the present dry. This, however, need not have been owing to a greater virulence of the poison, but was probably due to the more free use of intoxicating drinks, inattention to cleanliness, delay in seeking advice, and to the treatment being ill-understood.

It was probably in the last century that the phenomena of syphilis were first artificially divided into different stages,—viz., the primary, the secondary, and the tertiary. The primary symptoms are due to the application of the venereal poison by sexual intercourse or by inoculation, and they have already been treated of. The constitutional or secondary symptoms are the result of the indurated or infecting chancre. They may make their appearance in the course of two or three weeks, or not for several months, after the healing of the primary sore; being due to the tainting of the blood by the syphilitic virus. The longer the duration has been of the primary infecting sore, and the more marked the induration with which it has been attended, the greater will be the severity of the secondary symptoms. Moreover, the worse the general health at the time of contracting the primary ulcer, the greater the risk to the constitution subsequently.

There is every reason to believe that constitutional syphilis can be communicated from an infected to a healthy person directly—*i. e.*, without the intervention of primary disease, more especially where there is frequent contact between the two parties.* Secondary skin diseases and condylomata may be so communicated from the husband to the wife; the seminal fluid of a tainted man deposited in the vaginia of a healthy woman acting thus, without pregnancy occurring; or the husband being constitutionally affected may taint the ovum, and through the latter the mother will get

* The non-contagion of secondary syphilitic affections was long maintained by M. Ricord—following the opinion of John Hunter. It was more correctly taught at an earlier period, however, that the contagion of secondaries is a fact. Old Daniel Turner quaintly says,—"And this I intend shall suffice for its *Chronology* or Time, the *Topology* or Place, and the *Histriography* or Account of the disease in general; which, with some other writers thereon, we shall now define, *A venomous or Contagious distemper, for the most part contracted by impure Coition, at least some contact of the Genitals of both Sexes, or some other lewd and filthy Dalliance between each other that way tending.* I said *for the most part*, because it is beyond Controversy, the Infection is also communicated by other ways, as from Pocky Parents, by Inheritance; by sucking an infected Nurse, to the Child; suckling a diseased Child, to the Nurse; lying also in Bed with the Diseased, without any Carnal Familiarity; by which, though it may be possible for strong and vigorous bodies to escape, yet are the tender ones, especially of little Infants, very likely to be contaminated, as I have more Reason to believe than by bare Imagination." Syphilis: a Practical Dissertation on the Venereal Disease. By Daniel Turner, p. 10. London, 1717.

infected. It also seems proved (see the section on Cow-pox, p. 241) that the poison of syphilis may be introduced into the system by practicing vaccination with impure lymph. Tertiary symptoms generally appear at a long period after the primary disease, and usually some time after the secondary phenomena have disappeared. The diseases which have been termed tertiary are commonly deepseated affections of the skin, as tubercles; morbid actions in the bones, as periostitis, exostosis, caries, and necrosis; and destructive disorders connected with the production of gummata in important internal organs. Possibly the children of parents suffering from tertiary symptoms are predisposed to scrofula, or pulmonary consumption, or tabes mesenterica, or hydrocephalus.

Symptoms.—Constitutional syphilis usually manifests itself in the beginning by a considerable amount of general systemic disturbance. We find fever, mental depression, lassitude, pains in the limbs and joints, severe headache, and sleeplessness; while the skin assumes a sallow hue. Nocturnal exacerbation of this syphilitic fever and these pains is common. There may be dyspnœa, palpitation, œdema of the feet, and a cardiac bruit, —all the result of anæmia. Then unmistakable evidence is afforded by the production of well-marked cutaneous diseases; by ulcers on the skin; by warts, and condylomata or mucous tubercles; by tumors of the skin and subcutaneous areolar tissue; by partial or total alopecia or baldness, with loss of the eyebrows and eyelashes; by syphilitic iritis; by inflammation and ulceration about the roots of the nails; by superficial ulcerations on the tongue, lips, and pillars of the fauces; by ulceration of the larynx; by enlargement and induration of the testicle—syphilitic sarcocele; by diseases of the periosteum and bones; and, in a few instances, and as late tertiary symptoms, by diseases of the brain, spinal cord, lungs, heart, liver, spleen, &c.

The *syphilodermata* or *syphilitic cutaneous affections* are of various kinds; for they may belong to either of the orders exanthemata, vesiculæ, pustulæ, papulæ, squamæ, or tubercula. Probably of all the syphilides the squamous or scaly diseases are the most common; the eruption appearing in patches, being of a reddish coppery color, having the scurf renewed as fast as it is shed, often showing a tendency to excoriate or ulcerate, and being attended with fever or some constitutional disturbance. The syphilitic tubercle varies in size from a pea to a pigeon's egg, is of a polished brown hue, is very prone to ulcerate, and most frequently has its seat on the chest or face or abdomen. Small groups of tubercles sometimes attack the nose, the forehead, or the tongue; usually terminating in the formation of inveterate ulcers. The syphilitic maculæ or stains may be of a brown or dirty yellow color, and as they often prove incurable it is fortunate that they are of little consequence. It is surprising how frequently chloasma is erroneously set down as one of the results of syphilis, being confounded with these maculæ.

Speaking very generally the syphilodermata are obstinate: many of them will persist for years, unless properly treated. They give rise to less heat and irritation than non-specific cutaneous rashes. Mixed forms of eruption are often present at one time, especially at early periods of the disease; pimples, pustules, scabs, and scales, running into each other on the surface of the same bearer. The skin is seldom affected without other indications of syphilitic infection being present; such as a thinning of the hair, alterations in the voice, ulcers on the tongue, redness about the fauces, nocturnal pains in the limbs, substernal tenderness, muscular or osseous nodes, mucous tubercles, syphilitic sarcocele, iritis, &c. And lastly, the diagnosis will sometimes be aided by the effect of remedies; mercury and

iodine proving much more valuable in the syphilitic than in the non-specific eruptions.

Condylomata or *mucous tubercles* either occur as small rounded tubercular elevations of the integument, or as large irregular and indurated patches owing to the coalescence of several tubercles. With women, particularly, they are often amongst the earliest of the constitutional affections; appearing on the labia, perineum, and about the anus. In men they form chiefly on the scrotum, around the anus, on the nates, thighs, prepuce, &c. Sometimes the elevated patches are of a whitish color, looking as if nitrate of silver had just been rubbed over their surface; while in other cases they are copper-colored, and exhale an acrid fetid discharge.

These indurated tubercles may appear on individuals who have never had any primary sore. For example, a man who has suffered from an infecting chancre and been apparently cured, gets married. A few months afterwards, his wife exhibits numerous condylomata, swellings of the glands in the groin, superficial ulcerations about the fauces, and subsequently a secondary eruption. Yet the husband has had no fresh disease. Unfortunately, his constitution has never been freed from the poison ingrafted prior to marriage.

Secondary syphilitic affections of the uterus are by no means uncommon. They may either prevent conception; or, failing to have this effect, they will probably be the source of infection to the embryo. In these cases, the vaginal portion of the uterus is found enlarged and tender; the lips are indurated; there are often one or more patches of excoriation around the os, of such extent now and then as to be mistaken for the ulceration of cancer; and there is a constant tenacious muco-purulent discharge from the uterine cavity. When the throat or the skin is likewise affected, the diagnosis will be much facilitated. These symptoms are rebellious, and only removed with difficulty; a combination of local with constitutional treatment being required.

Syphilitic tumors of the skin and subcutaneous connective tissue generally appear long after the healing of the primary sore. They may have their seat on any part of the body, the forearm and outer part of the leg being the regions in which I have most often met with them. If their resolution is not effected in the earlier stages, they gradually soften and ulcerate; or if in ignorance of their true nature they be lanced, or if attempts be made at their excision, the most foul, and painful, and inveterate sores will be produced.

Inflammation of the iris originating in syphilis is often associated with other forms of secondary disease, especially with one of the syphilodermata. In tertiary affections this modification of iritis has a tendency to become chronic: relapses are very common. The chief features which it presents are these: The affected iris loses its natural brilliancy, while the pupil has a dull, and perhaps irregular appearance. There is a rapid effusion of lymph on the iris, especially at the edges of the pupil, in the form of reddish-yellow nodules, which are sometimes so large as nearly to close the pupil; or the lymph may be spread over the area of the pupil as a film, which gradually increases in thickness. Blue irides assume a greenish tint, owing to the presence of yellow albumen in the aqueous humor. The cornea will either remain transparent, or become hazy throughout its lower half from the presence of numerous minute spots. There is a vascular zone in the sclerotic, but the diffused redness of the eyeball characteristic of rheumatic iritis is wanting. There is but little pain or intolerance of light, compared with what happens in other forms of iritis. One or both eyes

may be affected; but in cases of relapse the right and left eyes are often attacked alternately.

Loss of hair from syphilitic poisoning seldom occurs without other symptoms. It may take place not only on the head (*alopecia* or *baldness*), but will now and then affect the eyebrows, eyelashes, whiskers, &c. This result is frequently combined with the excessive formation of scurf upon the scalp. In such cases too, atrophy of the finger nails, with a crumbling of their edges, is not uncommon. At times we find the patient suffering from onychia; or there sets in some chronic inflammatory action (psoriasis) about the roots of the nails, so that these structures become thick and furrowed, crack or break easily, and even fall off. Cases of syphilitic whitlow are not very common.

The *syphilitic ulcers of the fauces, tonsils, and pharynx* are in many instances excavated, covered by an ash-colored slough, and surrounded by a livid unhealthy appearance of the mucous membrane. Occasionally they slough, and extend rapidly; they cause but little pain, and no great difficulty of deglutition; and they are always attended with more or less constitutional disturbance. *Ulcerations of the nostrils* are also not uncommonly the only symptoms of the general infection of the system. They give rise to offensive and profuse discharges, with a marked alteration in the voice; and, if not checked, to disease of the cartilages or nasal bones. *Deep fissures, ulcerations, and fungoid vegetations upon the tongue* may owe their origin to the poison of syphilis, or to the abuse of mercury. In the former case there will generally be found other symptoms of this disease; while, in the latter, the submaxillary glands are frequently also swollen and tender. The venereal ulcer which shows itself at the side of the tongue is callous to the touch, is made painful by stimulating food or drink, is hard, is often covered with a slight dirty-yellow secretion, and looks as if a portion of tissue had been punched out. The smooth bald patch sometimes met with on the same organ is believed by certain authorities to be always venereal. Dr. Colles states, as a remarkable fact, that syphilitic ulcers invariably occur on the upper lip, while cancer as invariably invades the lower.

The partial enlargements of the bones called *nodes* arise only when the system has been much affected by the poison of syphilis: they are the result of effusion between the periosteum and bone, and are perhaps caused by superficial inflammation of the osseous tissue. A careful examination of the sternum, and especially of the lower half, will sometimes detect a tender spot, technically known as *substernal tenderness*. In many of these cases some of the superficial inguinal glands will also be found enlarged, hard, and painless; or even one or more of the posterior cervical glands may be swollen and indurated. All the syphilitic affections of the periosteum and bones are attended with wearying pains; which latter are increased by warmth, are aggravated at night, and are relieved by iodide of potassium. This agent, however, seldom effects a permanent cure; mercury in some form (best by the vapor bath, F. 131) being required to prevent a relapse.

Indurations of limited portions of a muscle are now and then met with, feeling very much like distinct tumors. These *muscular nodes* or *gummata* have been mistaken for cancerous growths; and under this impression surgeons have occasionally attempted their extirpation. M. Ricord and others have recorded the histories of cases where nodes of this kind have been found in the walls of the heart.

With regard to the other internal organs most liable to suffer from the syphilitic poison we must remember the liver, the brain and dura mater, the spinal cord and nerves, the lungs, and the testicle. Independently of

the special syphilitic diseases of these viscera, the bad health which the poison gives rise to acts from time to time like many other cachectic conditions, and helps to set up that kind of tissue metamorphosis known as the amyloid or albuminous degeneration. The peculiarity of the syphilitic poison consists in the proneness to form a new fibro-plastic material in different parts of the body; this material being either thrown out in masses or gummata, or else infiltrated through the tissues. These conditions are well seen in the *liver*. Thus, according to Dr. Wilks, there are three varieties of the syphilitic liver. The first is that in which the whole gland is infiltrated by a new fibre-tissue, producing general hardening and enlargement; it is mostly seen in young children who have died of hereditary syphilis. In the second, a new material deposited in the course of the portal vessels has produced a contraction resembling that of cirrhosis. It may cause dropsy; while it is often associated with lardaceous degeneration. The third kind is that in which the organ is pervaded by distinct nodules of new formation. These masses are seen scattered through the gland; while they vary in size from that of a pea to a walnut. So again in the *lungs*, the syphilitic affection occurs under the form of nodules or gummata, or as a diffused or interstitial material. Dr. Wilks states that in several cases where marked syphilitic disease has existed elsewhere in the body, the lungs have presented that condition known as fibroid disease—described by some as chronic pneumonia. This gentleman also expresses his belief that phthisis is a common consequence of syphilis; not by the production of tubercle, nor by the formation of distinct gummata, but by the interstitial fibroid change, which eventually disorganizes, so that the patient presents the ordinary physical signs of consumption. And lastly, in the *brain* itself, or on its membranes, gummatous nodules are found, either in connection with, or independently of, syphilitic inflammation of the cranial bones. Cerebral softening, and other lesions of the brain-substance, are not uncommon in cases where the symptoms of constitutional syphilis have extended over some years. Amongst other terminations, hemiplegia, paraplegia, and epileptiform convulsions are not so very rare. It is in these instances of brain lesion that Virchow has observed aneurismal dilatations and other morbid conditions of the large bloodvessels.

Diagnosis.—The longer the interval which elapses between the primary disease and the appearance of the secondary symptoms, the greater will be the difficulty of diagnosis. It may be of assistance to remember that syphilitic cutaneous affections generally occur in connection with various forms of ulceration about the soft palate and fauces; and that the skin disease repeatedly assumes a dusky copper color. Sometimes the suboccipital lymphatic glands are enlarged in these cases. Of symptoms which exist singly, syphilitic sarcocele is the most common; while it is also, as a rule, one of the latest exhibitions of the disease. The syphilitic tubercle of the face, when ulcerated, is not unfrequently mistaken for lupus; but it may be distinguished by its greater depth, the sharpness of its edges, and its dusky brownish color. The history of the case can perhaps be made to throw light upon its nature; but a truthful report is not always to be obtained. When the patient is a married man, the health of his wife and children will form a guide in enabling us to arrive at a correct diagnosis.

Many cutaneous diseases have been erroneously referred to the poison of syphilis, and much unhappiness thereby produced. Suicide has even been attempted under the distress thus engendered, as will be shown in the section on Syphiliphobia.

Prognosis.—Constitutional syphilis, if neglected, is most likely ultimately to destroy life. It may do so directly by inducing some affection of the

larynx, nervous system, liver, spleen, kidneys, or intestines; but very often it acts indirectly by bringing out latent tubercular disease, or it can directly produce pulmonary consumption. Certain authorities state that a perfect cure is never effected; but in patients under forty, at all events, complete recovery generally follows well-directed treatment. I am rather skeptical of cases getting well when left alone; but there are writers who think the disease may wear itself out.

In many cases of constitutional syphilis the symptoms are relieved by remedies, without a radical cure being effected. Periods of latency then occur, during which the patient appears well; but even after a long time the poison can be roused into activity again and again, and especially by causes which depress the powers of life. Moreover, during the period of latency the individual may beget a tainted child.

Treatment.—Directly the constitutional affection clearly manifests itself, attempts should be made to effect a cure. With women, pregnancy forms no bar to the treatment; since abortion is much more likely to follow from the disease, than from the remedies.

The therapeutical agents required in the treatment are not very numerous, but they demand great caution and discernment in their application. The *diet* should be usually light and nutritious. White fish and meat may be allowed; cream, milk, and raw eggs are excellent articles; but with the exception of a little claret or of sherry and water, stimulants are commonly to be forbidden. Warm *clothing* is requisite; and generally flannel ought to be worn next the skin during the day. *Cold* and *damp* are injurious. Consequently, although confinement to the house is very seldom necessary, yet care is to be taken to avoid exposure to wet or to the night air. In all cases the use of *warm water*, or *vapor*, or *Turkish baths*, once or twice a week, will prove of great service; and, provided they do not induce debility, cannot be productive of any mischief. *Opium*, also, will be needed where there is much pain, or when there is an inability to sleep at night, or when there is general irritability; and it may be given to the extent of three or four grains in the twenty-four hours. The extract is the preparation which I usually prefer; its efficacy being increased by combination with small doses of extract of belladonna, or full doses of henbane. But the essential remedy, and that which is absolutely necessary to effect a permanent cure, is *mercury*. "Nothing," says John Hunter, "can show more the ungrateful or unsettled mind of man than his treatment of this medicine. If there is such a thing as a specific, mercury is one for the venereal disease in two of its forms."* There are two principal ways in which this mineral may be introduced into the system, viz., either by the stomach or by the skin. In the former case, we administer a solid or liquid preparation, such as blue pill, calomel, or the solution of corrosive sublimate; in the latter we resort to inunction with the mercurial ointment, or we use the mercurial vapor bath. In my own practice recourse is always had either to inunction or the bath. Both methods I believe to be equally efficacious; but whereas one plan is dirty and disagreeable, the other is cleanly and pleasant. If it be thought preferable to trust to inunction, from the eighth to the fourth of an ounce of the mercurial ointment should be thoroughly rubbed into the body (the inside of the thighs is a convenient part) every night at bedtime, until the gums are slightly touched. This proceeding is particularly valuable in the treatment of young children; sixty grains of the ointment being spread on a flannel roller, which is then wound round the body. When mercurial fumigation is employed, the bath (F. 131) ought to be used at first every

* The Works of John Hunter. Palmer's Edition, vol. ii, p. 427. London, 1835.

night, and then for two or three nights a week. By such baths I have frequently cured cases which have resisted all other plans of treatment. In many chronic examples the solution of perchloride of mercury (F. 27) repeated for many weeks, proves very useful. For the squamous cutaneous diseases, the green iodide of mercury (F. 53), or the red iodide of mercury (F. 54), can be advantageously used; especially if the mercurial vapor bath be employed at the same time. The subcutaneous and muscular tumors will generally be dispersed by the green iodide of mercury, the mercurial vapor, blisters, and pressure with the mercurial plaster.

Amongst other remedies which deserve a brief notice, mention should be made of *Donovan's triple solution* (F. 51), which will often cure the squamous cutaneous diseases; the *iodide of potassium* (F. 31), which is invaluable when the bones are affected, if the mercurial vapor be gently used at the same time; the *iodide of sodium* (F. 39); and of the *iodide of iron* (F. 32), which is particularly valuable in advanced stages of the disease, or in weak anæmic subjects. The influence of setons and repeated issues in preventing the localization of the disease in important internal organs has not yet been ascertained. In epilepsy due to this affection, however, setons and blisters to the back of the neck have been thought to keep off the attacks.

In all forms of late or so-called tertiary syphilis, when the patient's constitution will generally be found broken down, we must try and effect a cure by nourishing food, cod-liver oil, opium, large doses of iodide of potassium, and the calomel vapor bath. Such cases, however, are very intractable.

These remarks would be incomplete without a notice of the treatment of this affection by *syphilization*. A few years only have elapsed since Auzias Turenne, in performing some experiments on animals with the poison of syphilis, ascertained that each succeeding chancre produced by inoculation became less and less, until a period arrived when no sore of any kind could be produced by the application of the venereal virus. From this the inference was drawn that, by prolonged inoculation with the syphilitic poison, a constitutional state was produced in which the system proved to be no longer capable of being affected by syphilis; just as happens, *mutatis mutandis*, in inoculation for small-pox. Hence, to obtain perfect syphilization or immunity, an individual must undergo constitutional syphilis; but he must be forced rapidly through this state by repeated inoculations, in order that his organization may not be injured. This practice has found, and in all probability will find, but little favor in our country; although recently in France, and Germany, and Italy, attention has been paid to it, and curious phenomena brought to light. Amongst other syphilographers who have made essays in this line of treatment, Sperino, Physician to the Venereal Hospital of Turin, has distinguished himself. This gentleman published in 1853 a detailed account of 96 cases of syphilization; of which 53 were examples of aggravated primary syphilis, and 43 of severe constitutional disease. Of the primary cases 50 were cured, 2 failed, and 1 was treated by other means in addition to syphilization: of the 43 with constitutional syphilis, 26 were treated by syphilization alone, 25 of these being cured; 17 were treated by syphilization, with mercury and iodine. Sperino inoculates for from 6 to 10 chancres at each sitting; and allows about three or four days to elapse between each operation. By continued inoculation the ulcers become less and less until no effect is produced; but the individual is still susceptible, though in a less degree, to another kind of matter, again to a third, and so on until at last no effect is produced by any syphilitic poison. It is strange that the general health does not suffer,—indeed it improves during the process of inoculation. The time required to produce immunity varies; in one case it was obtained after 71 chancres, but this

number seems to be much smaller than usual; for in most instances upwards of 300 were produced, the treatment lasting for nine or twelve or twenty months and more. The majority of Sperino's patients were prostitutes, and they submitted themselves most readily to the treatment. It may be practiced at any age. To obtain a complete cure when the patient has previously been mercurialized, the use of iodine has often to be combined with syphilization. Dr. Boeck asserted in 1858, in consequence of results he had obtained from syphilization alone in those who had not been previously mercurialized, that *in no disease have we a more certain method of cure.* The disadvantage of the method is its offensive nature, and the length of time necessary for effectually carrying it out; but then, on the other hand, the immunity produced is thought probably to last for life.

In conclusion, it must be allowed that if syphilization be capable of effecting all the good that its supporters assert, we have still something to learn as to the varieties and effects of the syphilitic poison. For these gentlemen deny that the cure is due to the lapse of time, or to the production of simple suppurating sores which act on the principle of depuration. Some authorities get rid of the difficulty by throwing doubts upon the nature of the virus used for inoculation. M. Henry Lee is of opinion that the matter employed in these cases was obtained from the soft non-infecting sore, since Boeck states that the best kind is that derived from a chancre attended by a suppurating bubo; while the phenomena of the artificial disease, excited by inoculation, are characteristic of the soft and not of the hard chancre. Supposing this view to be true, syphilization is only an "inoffensive playing with soft chancres." But its correctness has been denied, and amongst others by one of M. Boeck's friends, M. Bidenkap, who asserts that the virus of the infecting chancre has been constantly used for curative syphilization in the Hospital of Christiana. He does not say, however, that indurated sores result,—a circumstance which seems impossible when the system is contaminated.

VII. INFANTILE SYPHILIS.

Syphilis in the infant may be hereditary or acquired. *Hereditary* syphilis happens thus: The mother during pregnancy suffers from constitutional syphilis; and she either supplies a vitiated ovum, or her blood contaminates the nutritive elements furnished to the fœtus during intra-uterine life. Or the taint is derived entirely from the diseased semen of the father; the mother having been and continuing healthy, unless she becomes infected by the poisoned fœtus. Or again, both parents may be suffering from constitutional syphilis at the time of fecundation, in which case there is a very slight chance of the offspring escaping. In *acquired* syphilis the delicate infant's body gets infected by inoculable matter on the mother's genitals at the time of birth; or its system suffers from sucking at the breast of a syphilitic nurse;* or else inoculation occurs from

* This mode of infection was early recognized. The following curious history shows very clearly the evil results which follow from the employment of an unhealthy nurse: "An honest citizen saith he granted his most chaste wife, that she should nurse the childe which she was lately delivered of, if she would keepe a nurse to be partaker of the travell and paines; the nurse that she tooke by chance, was infected with *Lues Venerea*, therefore she did presently infect the foster childe, and he the

the use of impure lymph at vaccination. The disease in two of these forms of acquired syphilis may manifest itself by a primary sore, resembling a chancre in the adult. But such cases must be very rare, as I have never yet seen an instance of it; whereas examples of constitutional syphilis in nurslings are daily met with in hospital practice.

Symptoms.—For the first two or three weeks after birth the infant may be apparently healthy; or, as rarely happens, it will be born with its skin of a dull color, and having its features contracted, so that it looks like a little old man. Supposing when it comes into the world there are no manifestations of disease, yet often within the month symptoms of coryza gradually set in, attended with a peculiar snuffling during breathing, hard cough, slight difficulty in sucking, and dryness of the lips and mouth. The skin soon gets harsh and dry, the voice shrill and hoarse (it has been compared to the squeaking of a penny trumpet), the mucous membrane of the mouth and throat becomes affected with superficial ulcerations, and an erythematous blush appears upon the soles of the feet and palms of the hands. The nails also crack or split in many cases. When the disease runs on unchecked, large patches of the skin assume a light-brown color, the epidermis exfoliates, and the parts around the mouth, nostrils, buttocks, anus, and flexures of the joints become copper-colored and fissured and excoriated. The eyes are either specially affected or they may simply get weak, while the margins of the eyelids are sore. The hair gets dry and thin, or it falls off. Moreover, the child becomes irritable, cries almost constantly, wastes rapidly, and daily grows weaker, while it often has sickness and diarrhœa.

There are certain special diseases to which syphilitic children are liable, and which therefore demand attention. Amongst these may be mentioned *disease of the liver*. According to Diday, where the lesion has reached its maximum the gland is hypertrophied, hard, and globular. It is resistant to pressure; and when cut into it creaks slightly under the scalpel. Its appearance is peculiar; for there is seen on a yellowish ground a layer of white opaque granules, like grains of semola. This fibro-plastic matter obliterates the capillaries, and diminishes the calibre of even the larger vessels; it compresses the hepatic cells, and hence there is an arrest of the secretion of bile.* I am not aware that encysted gummy tumors, of a

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mother, and she the husband, and he two children which he had daily at his table and bed, not knowing of that poison which he did nourish in his own body and intrals. But when the mother considered and perceived that her childe did not prosper or profit by the nourishment, but continually cried and waxed wayward, desired me to tell her the cause of that disease, neither was it any hard matter to doe, for his body was full of the small-pocks, whelkes, and venereous pustules; and the breasts of the nurses and mother being looked on, were eroded with virulent ulcers; and the body of the father and his two sonnes, the one about three yeares, and the other foure yeares of age, were infected with the like pustules and swellings that the childe had: therefore I shewed them that they were all infected with *Lues Venerea*, whose beginnings, and as it were provocations, were spred abroad by the nurse that was hired, by her maligne infection. I cured them all, and by the helpe of God, brought them to health, except the sucking childe, which died in the cure: and the nurse being called before the magistrates, was punished in prison, and whipped closely, and had been publikely whipped through all the streets of the citie, if it had not been for the honors of that unfortunate family."—A Profitable and Necessarie Book of Observations for all those that are burned with the Flame of Gunpowder, &c. By William Clowes, p. 152. London, 1637.

* The syphilitic nature of the hepatic affection in the following cases is perhaps not quite certain, but it seems sufficiently probable to render it worthy of notice. On February 26th, 1862, I saw, in consultation with Mr. Holding, an infant ten days old suffering from jaundice. The liver appeared increased in size, and seemed

cheesy consistence and appearance, have been found in the livers of new-born children. Such growths in adults are always syphilitic.

Our knowledge of the *syphilitic pulmonary affections* is scanty. A form of lobular pneumonia, due to indurations of the parenchyma of the lung, has been described by Depaul. The indurated nodules soften, cavities form in their centres, and thus collections of purulent fluid take place. They are generally found developed at birth, and they early lead to a fatal termination. Syphilitic abscesses may form in the thymus gland, as well as in the lungs.

Syphilitic iritis in infants is very uncommon. In 23 cases collected by Mr. Hutchinson, the average age at which it began was 5½ months. When it occurs we shall generally find other symptoms of inherited syphilis,—such as copper-colored eruptions, mucous tubercles about the genitals, aphthæ, and the snuffles. According to Mr. Dixon the lymph which is effused does not assume the form of tubercular masses on the edge of the pupil, as in the adult; but either fills the area of the pupil as a pale yellow or reddish semifluid mass, or sinks down to the bottom of the anterior chamber, like ordinary hypopyon. The pupil is irregular, and the iris discolored. This disease is to be treated by mercurial inunction, good pure milk, beef tea, and cod-liver oil if necessary. Dilatation of the pupil ought to be kept up by the daily use of atropin drops or paper.

Chronic interstitial keratitis—often called strumous corneitis—has been especially studied by Mr. Hutchinson. From his researches it seems proved that this is essentially an heredito-syphilitic disease, often accompanied or preceded by iritis. It appears between 5 and 18 years of age. At the commencement there is a diffused haziness near the centre of the cornea of one eye, without ulceration, and with very slight evidence of the congestion of any tunic. There is, however, always some irritability of the eye, with dim sight. On careful examination, dots of haze ("microscopic masses of fog") are perceptible in the structure of the cornea; which dots increase until the whole transparent tissue, except a band near its margin, has become as opaque as ground glass. Now, there is a zone of sclerotic congestion, with intolerance of light and pain round the orbit. After six or eight weeks the other cornea gets attacked. Then follows a period in which there is nearly complete blindness, but after this the eye first affected begins to clear. During the course of a year a surprising degree of improvement will probably take place. In milder cases, and under suitable treatment, the duration may be much less and the restoration to transpar-

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more dense than was natural. A healthy wet-nurse was ordered to be procured, and the infant was put in a weak nitro-hydrochloric acid bath, night and morning. Five days afterwards death took place. The mother of this child was thirty-seven years of age and healthy, though far from strong. The father appeared well, but had lost his hair. The mother had been pregnant eleven times. The first child died when fifteen months old; the second is living, and is twelve years old; the third is living, and is ten years old; then there were two abortions; and subsequently six children were sucessively born, who were apparently healthy at birth, but who in a few days became affected with fatal jaundice. The yellow tinge was not generally well-marked. My opinion was that after delivery of the third child, the husband suffered from constitutional syphilis, which had left a slight taint; and that his infants had waxy or albuminoid disease of the liver from the effect of this poison.

At the end of August, 1863, the mother applied to me, being about five months advanced in her twelfth pregnancy. I at once put her upon a course of corrosive sublimate; and this medicine was continued until December 29th, when I delivered her of a fine healthy girl. About ten days afterwards the infant had a slight attack of jaundice, which however passed off completely; on October 22d, 1864, she remained strong and well.

ency complete; although in many instances patches of haze remain for years, if not for life. Where the best recoveries have been obtained, the eye usually remains somewhat damaged as to vision, and often a degree of abnormal expansion of the cornea is apparent. The subjects of this disease almost always present a very peculiar physiognomy; of which a coarse flabby skin, pits and scars on the face and forehead, cicatrices of old fissures at the angles of the mouth, a sunken bridge to the nose, and a set of permanent teeth peculiar for their smallness and bad color *and the vertically notched edges of the central upper incisors*, are the most striking characters. Moreover, in many cases one or more of the following suspicious forms of disease have either been coincident with it, or have occurred previously; viz., ulcerated lupus, nodes on the long bones, psoriasis about the face, otorrhœa, chronic enlargement and subsequent atrophy of the tonsils, ulcers in the throat, a thickened condition of the parts under the tongue, and chronic engorgements of the lymphatic glands.

Deafness is not very infrequent in the subjects of inherited syphilis. It is usually partial. The sense of hearing fails, without any local cause being apparent.

Amongst other marks of the heredito-syphilitic diathesis, the condition of *the permanent teeth* is deserving of attention. According to Mr. Hutchinson the peculiarities they present are the most reliable amongst the objective symptoms, if the patient be of age to show them. This gentleman says, "Although the temporary teeth often, indeed usually, present some peculiarities in syphilitic children, of which a trained observer may avail himself, yet they show nothing which is pathognomonic, and nothing which I dare describe as worthy of general reliance. The *central upper incisors of the second set are the test teeth*, and the surgeon not thoroughly conversant with the various and very common forms of dental malformation will avoid much risk of error if he restrict his attention to this pair. In syphilitic patients these teeth are usually short and narrow, with a broad vertical notch in their edges, and their corners rounded off. Horizontal notches or furrows are often seen, but they as a rule have nothing to do with syphilis. If the question he put, Are teeth of the type described pathognomonic of hereditary taint? I answer unreservedly, that when well characterized, I believe they are. I have met with many cases in which the type in question was so slightly marked that it served only to suggest suspicion, and by no means to remove doubt, but I have never seen it well characterized without having reason to believe that the inference to which it pointed was well founded."*

Prognosis.—The duration of the disease varies. Death may occur at an early period; but under efficient treatment, recovery, or apparent recovery, usually takes place speedily. When a child survives the first year, the danger to life is very much lessened. In some few instances death occurs suddenly,—perhaps just as the disease appears to have yielded to the remedies.

Treatment.—Supposing the mother to present any symptom of syphilitic disease, she ought not to be allowed to suckle her infant for a single meal. A vigorous healthy wet-nurse will have to be procured, or the child must be carefully brought up by hand. The latter is the only alternative when the infant is already suffering, lest the nurse herself become diseased. For although Ricord and others deny the possibility of this occurrence, yet I cannot but think there is more risk than a healthy woman should be

* A Clinical Memoir on Certain Diseases of the Eye and Ear, consequent on Inherited Syphilis, p. 204. London, 1863.

allowed to incur. At all events, no nurse ought to be employed under these circumstances without warning her, in the presence of both parents, of the chance she runs of infection.

Then, as a general rule, directly symptoms show themselves in the child, mercury, in some form or other, is the remedy to be resorted to. It has been recommended to cure the infant through the medium of the mother, by getting her system under the influence of mercury; but this practice is too uncertain to be depended upon, and is unjustifiable if the parent have no symptoms demanding a mercurial course. The best plan is either to administer the hydrargyrum cum cretâ, or to apply the mercurial ointment, as long since recommended by Sir Benjamin Brodie. To an infant six weeks old, one grain of gray powder with two or three of the aromatic chalk powder, may be given twice or thrice in the day until all the symptoms cease: or should this medicine gripe and purge, or appear inefficient, as it frequently will, the mercurial ointment is to be used. This is easily applied by spreading sixty grains, or a little more, on the end of a small flannel roller, and then winding the band round the infant's abdomen or knee, repeating the application daily. The movements of the child produce the necessary friction; and the cuticle being thin, the mercury speedily enters the system. "Very few of those children ultimately recover in whom the mercury has been given internally; but I have not seen a single case in which the other method of treatment—mercurial inunction—has failed."* Without believing in the absolute correctness of the inference to be drawn from this sentence, I still think more highly of inunction than of any other procedure.

When the use of mercury appears objectionable, the iodide of potassium in half-grain, or the chlorate of potash in two or three grain doses, repeated every six hours, may be tried. The latter salt, with a few drops of tincture of bark, has often appeared serviceable in cases attended with great feebleness.

The local treatment for the excoriations consists in great attention to cleanliness, and the application of the oxide of zinc ointment; or a cerate composed of sixty grains of the unguentum hydrargyri nitratis to one ounce of lard may be employed. The child should be put in a warm bath at least once a day.

VIII. SYPHILIPHOBIA.

Syphiliphobia [from *Syphilis* + φοβέω = to dread], or Monomania Syphilitica, may be described as a morbid or hypochondriacal fear of syphilis, producing imaginary symptoms of the disease. And inasmuch as it is one of those nervous disorders which cause much unhappiness, and by which the advertising quacks thrive, it demands a short notice.

All classes of society may suffer from this affection,—the rich and poor, those without occupation and the busy workman. In men the symptoms are very much allied to such as are presented in fictitious cases of spermatorrhœa or of impotence. The amount of mental torture which the patients undergo is often sufficient to impair the general health; and then this impairment is regarded as a convincing proof that the system is con-

* Sir Benjamin Brodie's Lectures on Pathology and Surgery, p. 245. London, 1846.

taminated. The symptoms are also further aggravated by the sufferer perusing works on diseases of the generative organs, and perhaps by visiting filthy and indecent museums. At times the distress has been so great and continuous, that the victim has committed suicide to escape from his imaginary evil. Men, in most respects shrewd and sensible, become almost fatuous about their health under the influence of this syphiliphobia. But some of the most troublesome cases which have fallen under my notice have been in women. A lady was long under my care whose condition in May, 1864, became really serious. About ten years previously, when abroad with her husband, the latter contracted a gonorrhœa. This he appears to have communicated to his wife, for she suffered from an abundant purulent discharge with burning pain during micturition. She was told that her sufferings were due to the venereal disease, and that it must have been contracted by sitting on a dirty water-closet. Although she seems to have been thoroughly cured in a few weeks, and soon to have dismissed the subject from her mind, yet about the beginning of 1862, when her health began to fail, she unfortunately recollected the attack. Living near the banks of a river, in a very dull locality, she suffered from ennui and rheumatism; and then the one idea constantly presented to her mind was, that the venereal poison had attacked her bones. She was unwilling to reside away from her home during the damp foggy months of the year, and hence would not listen to the suggestion that her house was unhealthily situated. And though after each interview with me she appeared convinced that her opinions on the subject were erroneous, yet a night's rest sufficed to banish the recollection of all she had been told, and the delusion became as strong as before. I am glad to add that she subsequently recovered, appearing quite well and happy when last seen towards the close of 1867.

In the management of these cases it has to be remembered that the patient experiences much mental distress. This suffering is not to be lightly treated. The practitioner must exhibit considerable tact and great patience; he should show that he really feels an interest in the case; while instead of roughly controverting the delusion, he must gain the patient's confidence, and gently endeavor to prove the non-existence of disease. As regards drugs, the remedies which I have found most efficacious are the various preparations of zinc, and small doses of strychnia or nux vomica (F. 407, 409, 411). But sometimes ferruginous tonics (F. 380, 392, 408) appear to be necessary; sometimes the mineral acids (F. 376)—perhaps with cod-liver oil; and sometimes the hypophosphite of soda with bark (F. 419). In all cases a good nourishing diet should be ordered; while tepid or cold baths (especially sea-bathing) had better be recommended, together with free exercise in the open air.

PART IV.

DISEASES OF THE NERVOUS SYSTEM.

THE nervous system may be said to consist of two portions,—the cerebro-spinal and the sympathetic. The former is composed of the brain and spinal cord, with the sensory and motor nerves proceeding from them; and it constitutes Bichat's nervous system of animal life. The latter, or the sympathetic or ganglionic portion, consists of a series of ganglia, arranged on either side of the whole length of the vertebral column; these ganglia being united by interconnecting nervous strands or prolongations, communicating with all the other nerves of the body, and supplying branches to the thoracic and abdominal and pelvic viscera as well as to the coats of bloodvessels. It forms Bichat's nervous system of organic life.

Both portions are made up of gray or vesicular neurine, and white or tubular neurine. In the vesicular substance, which contains nerve-cells in countless numbers, impressions are received and stored up; while from it we say that nervous force originates. The tubular or fibrous matter conveys impressions from without to the ganglia, and transmits impressions from the latter to organs or tissues where it is distributed. Hence, without any apparent difference in the structure of nerve-fibres, we find variety of function; one distinct set of fibres (centripetal, or afferent, or sensitive nerves) conveying impressions from the periphery to the centre; while another set (centrifugal, efferent, or motor nerves) conduct central impressions to the muscles.

The purposes served in the economy by the different nervous centres may be thus roughly sketched. Suppose that it were possible experimentally to destroy the whole sympathetic nerve, the consequence would be an immediate cessation of the action of the heart, bloodvessels, lungs, abdominal and pelvic viscera, &c. In the same way, destruction of the spinal cord would put an end to all power of movement and to sensibility. And so again, if the brain alone could be removed, every part of the body might remain sound, but all manifestations of mind would cease,—sensation, emotion, volition, and intelligence would be abolished.

The sagacity of an animal is in accordance with the amount of vesicular matter in the brain; this being abundant in proportion to the number and depth and complexity of the convolutions. The brain being the material organ of the mind, the manner in which the mental faculties become affected in disease gives us some clue to the precise situation of the abnormal force. Thus, there is disordered mental power at an early period, when the morbid action commences in the membranes of the brain, proceeding from without inwards; while this symptom is delayed in the case of tumors originating in the tubular neurine, the growth proceeding from the centre towards the circumference. In the one case the vesicular matter is early implicated; in the other, it only becomes so at an advanced period. Furthermore, chronic affections of the vesicular matter of the cerebral hem-

ispheres induce insanity, while acute disorders cause maniacal delirium. Where the central ganglia are likewise diseased, there will be found paralysis with mental derangement.

The nervous ganglia require a certain amount of repose, together with a due supply of pure arterial blood, for their nutrition and healthy action. Venous or impoverished blood, no less than blood contaminated with certain drugs or poisoned by bile or urea, will blunt the intellectual faculties as well as indispose for muscular action, in proportion to the amount of deterioration. When the oxidizing power of the blood is artificially increased, or where the blood is sent to the nervous centres in too great a quantity, an increase of mental and muscular power may be manifested; but such increase being accompanied by undue waste must lead to rapid exhaustion. The products of decay are removed through the urine; the urea, chlorine, phosphoric, and sulphuric acids being augmented in quantity when there is increased mental exertion. Both tea and coffee are excitants of the brain and nervous system, while they retard the decay of tissue and hence diminish the urinary constituents just mentioned.* Dr. Hammond, after experimenting upon himself with alcohol and tobacco, concludes that these agents increase the weight of the body by retarding the metamorphosis of the old tissues, promoting the formation of new, and limiting the consumption of fat.†

The average weight of the adult male brain (cerebrum, cerebellum, pons Varolii, and medulla oblongata) is 48 or 49 ounces avoirdupois. That of the female organ is some 4 or 5 ounces less. Insanity sometimes diminishes, sometimes increases, the brain-weight. Below a particular limit, an intelligent brain is not found. M. Broca has fixed this limit at 37 oz. for the male brain, and 32 oz. for that of the female. According to Professor Welcker 63.5 oz. is the greatest attainable weight of brain within a skull not pathologically enlarged. Cuvier had a brain of 64.5 oz., but Dr. Thurnam remarks that this celebrated man is said to have suffered from hydrocephalus when young. Dr. Abercrombie's brain was 63 oz., and Spurzheim's 55.06. The average specific gravity is 1.036. The composition of nervous material is roughly shown in the following table by L'Heritier:

Analysis of the Brain at different Periods of Life.

	Infants.	Youths.	Adults.	Aged.	Idiots.
Water, ...	827.90	742.60	725.10	738.50	709.30
Albumen, ...	70.00	102.00	94 00	86.50	84.00
Fat, ...	34.50	53.00	61.00	43.20	50.00
Osmazome and Salts,	59.60	85.90	101.90	121.80	148.20
Phosphorus, . . .	8.00	16.50	18.00	10.00	8.50
	1000.00	1000.00	1000.00	1000 00	1000.00

During the last year or two (1867–68) an advance has been made toward facilitating the diagnosis of diseases of the cerebro-spinal system by the use

* Sydney Smith wondered what the world would do without tea? How would it exist? One evening he said. "I am glad I was not born before tea. I can drink any quantity when I have not tasted wine; otherwise I am haunted by blue-devils by day and dragons by night. If you want to improve your understanding, drink coffee. Sir James Mackintosh used to say he believed the difference between one man and another was produced by the quantity of coffee he drank."—A Memoir of the Reverend Sydney Smith. By Lady Holland, vol. i, p. 388. London, 1855.

† Physiological Memoirs, p. 55. Philadelphia, 1868

of the ophthalmoscope; so that it would seem far from improbable, that in time the physician may be as much indebted to Helmholtz for his invention as is the ophthalmologist. The occurrence of symptomatic lesions about the fundus of the eye is found to be the rule, rather than the exception, in affections of the nervous system. At present our knowledge of these lesions is imperfect; but too much importance can scarcely be attached to marked alterations in the size or course of the large retinal arteries and veins, the condition of the vessels of the choroid, the state of the cream-colored optic nerve (the optic disk or papilla of some authors), and the presence of even very small extravasations of blood or of morbid growths or of pigment deposits. In many examples of Bright's disease, with imperfect vision, yellowish-white deposits of a fatty nature have been found sprinkled over the retina. Syphilitic inflammation of the textures within the cranium may be accompanied by a similar affection of the retina; the latter being left with irregular white patches scattered over its surface, while the optic nerve is also obscured by a layer of lymph. In these cases, irregular deposits of black pigment are likewise often seen distributed among the opaque portions of the retina; although such pigmentous deposits may also occur as the sequel of any kind of chronic inflammation.

According to M. Bouchut most of the diseases of the brain and spinal cord are accompanied by optic neuritis, retinitis, inflammation of the choroid, or atrophy of the optic nerve. The coincidence of optic neuritis with organic injuries of the nervous system is explained by the anatomical connections of the eye with the brain and spinal cord. Where disease or injury of the cerebro-spinal system causes some impediment to the cerebral circulation, there hyperæmia of the retina and optic disk will be the consequence. Let those portions of the brain in connection with the optic thalami, the corpora geniculata, or the corpora quadrigemina become the seat of acute or chronic inflammation, and the morbid process can readily extend to the eye by following the course of the optic tract and nerve. M. Bouchut also shows how other ophthalmoscopic appearances may facilitate the diagnosis. Thus, in optic neuritis and retinitis caused by acute or chronic diseases of the nervous system, the inflammatory action is generally observed equally in both eyes; whereas in injuries of the brain or its membranes, the optic neuritis is most marked within the eye corresponding to the affected hemisphere. Lastly, when together with changes in the optic nerve and retina we have impairment of sensibility and motion and intellect, the existence of organic disease of the encephalon is invariably indicated.

On making examinations of nervous tissue after death, considerable care is necessary to prevent morbid changes from being overlooked. The various essays of Lockhart Clarke have shown, as might be expected, that structures which would be regarded as healthy on an ordinary examination, may yet be proved to be very unsound by a minute examination of the properly prepared tissue. To thoroughly investigate the state of the nervous centres, they ought to be removed from the body as soon after death as possible. Then, having been viewed with a lens, incisions should be made according to some prearranged system; small portions being removed for examination, while fresh, under the microscope. The nature of the lesion being thus learnt, the morbid parts are to be steeped for three or four weeks in weak solutions of chromic acid; so that after hardening, thin sections may be cut, which can be moistened with glycerin and examined by the microscope.* The strength of the chromic acid solution recom-

* Full directions for making and preserving these sections, as well as for rendering them permanently transparent, are to be found in a paper entitled,—"Further

o it is probable that by and by alterations of brain-matter will conspicuous (as in cases of insanity) where at present our blindnts us from distinguishing anything abnormal.

I. INFLAMMATION OF THE BRAIN.

owledge of the effects of inflammation of the parts within the the *Encephalon*, from ἐν = in + κεφαλή = the head] is scarcely perfect to enable us to point out with certainty the symptoms icate inflammation of the substance of the brain—*cerebritis*, as ied from that of the membranes or *meningitis*. Fortunately the (desirable as it must be to frame a perfect diagnosis) is not of ctical importance; for if we allow that in a very few cases cereis simply, or that meningitis happens alone, still it is certain majority of instances the two affections are combined.
reating of this combination (*encephalitis*), however, a few words id as to what little we do know with regard to the diagnosis of from cerebral inflammation.

PLE MENINGITIS.—Inflammation of the membranes of the neningitis [from Μήνιγξ = a membrane, with the terminal *-itis*] arises without any apparent cause; or it can be produced by a w, or by disease of the ear or nose, or by exposure to the sun. of syphilis or rheumatism can also induce meningitis; and so eposit of tubercle, as will be shown presently. Inflammation of nater seldom occurs save as the consequence of blows or wounds, disease of the bones of the skull. In treating of meningitis, it distinguish between inflammation of the dura mater, and that chnoid and pia mater.
g generally, the chief *symptoms* of meningitis are fever, acute he head, irritability with early and violent delirium, frequent f the face followed by pallor, hard pulse, muscular twitchings,

confined; while there is intense pain in the head, which is increased by every sound or movement. The temperature is elevated, but not so high as in many kinds of fever, seldom reaching 102°. The face is alternately flushed and pallid: the conjunctivæ are injected, while the eyes are suffused and staring. Where it has been possible to use the ophthalmoscope, the existence of optic neuritis and retinitis has been shown. The delirium sets in early, the patient being noisy and very violent. There is great restlessness, muscular twitching, and sometimes strabismus. Vomiting is such a constant and important feature, that it will be again referred to. The symptoms now noticed generally last from three to four days; when the fever lessens, the pulse flags, the tongue gets brown and dry, the excitement diminishes, and the delirium is apt to pass into coma. In a few days more, the prostration has become extreme; and the symptoms get to resemble those presented in the last stage of typhus. When the disease ends favorably, the improvement is usually very gradual; being unattended by any critical sweat or looseness of the bowels.

Before proceeding, it will be better to fulfil the promise just made of further noticing the sickness which occurs in cerebral diseases. Every one knows that headache from gastric disturbance is as common as vomiting from cerebral derangement. A sick headache, *i. e.*, retching with distressing pain in the head, is the especial symptom of stomach derangement (gastric catarrh). In children, obstinate vomiting is particularly indicative of brain disease. The peculiarities which distinguish gastric or hepatic from cerebral sickness, may be thus arranged to aid our diagnosis:

Gastric or Hepatic Vomiting.	*Cerebral Vomiting.*
1. The nausea is relieved, at all events temporarily, by the discharge. It returns directly food is taken.	1. Little or no nausea, and the vomiting continues in spite of the discharge of contents of stomach.
2. There is tenderness over the liver and stomach. Pressure induces the inclination to retch.	2. No tenderness over liver or stomach. Pressure borne without inconvenience.
3. The pulse is frequent and weak.	3. The pulse is infrequent and hard.
4. Tongue furred; breath offensive; conjunctivæ often yellowish; and headache secondary as to time.	4. Tongue clean; breath sweet; conjunctivæ colorless or injected; and headache primary.
5. Griping abdominal pain, diarrhœa, and clay-colored stools.	5. Generally obstinate constipation.
6. Retching, and increased salivation.	6. Stomach emptied without effort; no salivation.
7. Sickness lessened by counter-irritation to epigastrium only.	7. Sickness lessened by counter-irritation to nape of neck only.
8. Complete disgust for food.	8. No disgust for food: perhaps the reverse.

The statements in these columns must of course be taken with some qualification. Speaking generally, they are correct. On the one side, the vomiting depends upon derangement of the liver or of the gastro-intestinal canal; on the other, it is owing to increased or sensorial or reflex action. I would only add, as a caution, that vomiting due to increased reflective mobility is not always caused by cerebral disease. Thus it occurs during pregnancy, as well as in certain uterine and ovarian disorders. Moreover, the most severe case of constant vomiting which has ever fallen under my notice was due to a slight ring of cancerous deposit around the œsophagus, nearly an inch above its termination in the cardiac orifice of the stomach. In this instance the morbid product seemed to act upon the stomach by reflex action, for the disease was so inconsiderable in amount that it could

not directly interfere with the normal functions of this viscus. In the sickness of pregnancy, as well as in cases resembling that just mentioned, there are no symptoms of gastric or hepatic derangement.

In *meningitis confined to the base* (frequently due to tuberculosis) the diagnosis is very difficult. Andral* relates the particulars of two fatal instances where the symptoms were very dissimilar. In one there was delirium at the commencement; with great fever, contracted pupils, raving, frequent pulse, teeth clenched as in trismus, and a retraction of the head. The tongue was natural. The patient seemed as if in profound sleep; while as the coma got more profound, the respiration became embarrassed, and death occurred as in apoplexy. On examination the entire lower surface of the cerebral hemisphere was found covered by a thick layer of pus contained in the pia mater. The second example presented at first pain in the temples, vomiting, constipation, symptoms of wry-neck, loss of appetite, and a desire for rest. When seen a few days afterwards the face was pale and dejected, and the look vacant: the eyes were sensible to strong light. The intelligence was clear, with the pulse and skin normal. The headache seemed the only important symptom; and it was unrelieved by bleeding, leeches, and blisters to the leg. Coma gradually set in, became profound, and ended in death. Up to the termination the pulse continued natural, and only at the last was respiration disturbed. At the autopsy the upper part of the brain and meninges proved to be healthy; but the lower surface of the pia mater was infiltrated with a purulent layer from seven to eight lines in thickness.

A peculiar modification of meningitis occasionally sets in during the progress of acute rheumatism. The invasion is sudden, is accompanied with great fear of approaching death, is followed by delirium, and often ends fatally—sometimes very rapidly so. It is a question whether the attack is due to a metastasis of the rheumatism from the joints to the brain, to rheumatic meningitis, to the employment of bleeding, or to the use of large doses of quinine (such as are especially used in France) for combating the rheumatic fever.† The post-mortem appearances are very variable; the membranes of the brain being sometimes found healthy, sometimes congested, sometimes with subarachnoid serous effusions, while very rarely pus has been discovered over the hemispheres.

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* The Clinique Médicale. Spillan's Translation, p. 16. London, 1836.

† As typical of this kind of treatment, the following case of death from supposed *cerebral rheumatism* may be mentioned: A robust man, a hard drinker, was admitted into the Hôtel Dieu, under Professor Trousseau's care, on account of a severe attack of rheumatic fever. He had already suffered similarly on three occasions, and in consequence there was a double lesion of the ventriculo-aortic office, adherent pericardium, and a large heart. On the day of his admission (the twelfth of the disease) several joints were affected, and it was predicated that the attack would prove severe and prolonged. Twenty grains of sulphate of quinine were given: the præcordial region was cupped in six different places. The following day the quinine was increased to two scruples, this dose being repeated on the third day. On the fourth day thirty grains were taken. The dose for the fifth and sixth days is not mentioned. On the evening of the latter, the pain in the joints had considerably diminished, and the patient was much pleased at his condition. An hour after expressing this pleasure he said he could not see, called out "thief," rushed from his bed and fell down. He struggled with two attendants while being assisted to bed, dropped back and died. All took place in less than fifteen minutes. At the autopsy nothing was revealed to account for the result. The brain was remarkably healthy, but there was injection of the pia mater covering it. The cardiac lesions were those already mentioned. There was no effusion into the affected joints, nor were the synovial membranes injected. The whole history of this case is detailed in Professor Trousseau's Lectures on Clinical Medicine, translated by Dr. Bazire. Vol. i, p. 513. London, 1868.

Meningitis, as a result of constitutional syphilis, is not so infrequent as might be imagined. The dura mater is more frequently affected than the arachnoid and pia mater. Lymph is generally effused; and the membranes usually become adherent. Small gummatous deposits are now and then found imbedded in the meninges; sometimes being in connection with nodes on the cranial bones. The chief symptoms produced by these deposits as well as by the inflammatory action, are mental depression or irritability, and sometimes sickness; with severe headache, which becomes especially aggravated at night. Giddiness, convulsions, paralysis, epilepsy, &c., have been observed. The appearance of the patient and his previous history will help the diagnosis. Iodide of potassium (F. 31) is the remedy; but the cure may perhaps be expedited by the simultaneous use of calomel vapor-baths, or of mercurial inunction. Sleep is to be afforded at night by opium.

Inflammation of the dura mater is generally the result of violence, or of tertiary syphilis, or of disease of the bones of the skull—particularly of the petrous portion of the temporal bone or of the ethmoid. Specimens of syphilitic caries of the frontal bone are to be seen in every hospital museum. With children, chronic affections of the ear and nose, which are often long regarded as trifling, sometimes terminate fatally by a rapid extension of the morbid action to the dura mater. In an instance of this kind about which I was consulted at the last moment, the acute symptoms came on so insidiously that no danger was apprehended until the child suddenly became comatose. In fact, up to the time that the latter occurrence supervened, nothing was complained of but headache and a desire for repose; the pulse continuing natural until death, and there being neither fever nor sickness. A discharge from the left ear had persisted since an attack of scarlatina some two years previously.

The appearances presented by the membranes after death from meningitis are necessarily of a fluctuating nature, much depending upon the severity and duration of the disease. Thus, if the case have run a very rapid course, the membranes are particularly vascular and dry; when the disease has continued for some days, there will be an effusion of purulent serum or of pure pus in the sac of the arachnoid and in the connective tissue of the pia mater; while supposing the morbid action to have had a still longer spell, layers of lymph may be found, together with concrete pus in the meshes of the pia mater upon and between the convolutions. Moreover, as the vascular pia mater not only invests the brain, but is prolonged into its interior, forming the velum interpositum and choroid plexuses of the fourth ventricle, so the traces of inflammatory action can perhaps be traced into the nervous matter itself. Sometimes, even the lateral ventricles contain false membranes. Or the mass of the brain may be œdematous; a condition more frequently found in children than in adults.

2. CEREBRITIS AND ABSCESS.—Partial inflammation of the brain without meningitis is of the rarest occurrence. Indeed, the membranes may be said to be always affected; though the energy of the mischief is found to be expended on the brain-tissue. The inflammation is either spontaneous or traumatic; the latter being the most common. Concussion, fracture of the bones of the skull, disease of the ethmoid, and mischief about the petrous portion of the temporal bone, are frequent antecedents. Sunstroke is also said to be an occasional cause. The most remarkable symptoms appear to consist of persistent, deepseated pain in the head; general malaise and vomiting; impairment of vision and hearing; confusion of ideas, with failure of memory; rigors; rapidly progressive emaciation; in

creasing weakness, and convulsive paroxysms, ending in paralysis or coma. The mental disturbance varies considerably according to the seat of the disease. At the end of three or four days there may be a copious effusion of serum, followed by all the symptoms of compression. Sometimes the inflammation ends in abscess, the latter perhaps forming without exciting any suspicion in the minds of the attendants.* No active treatment is of any avail in warding off a fatal conclusion. If by a fortunate chance recovery should occur, it may be partly due to good management,—decidedly not to the use of drugs.

An *abscess of the brain* has been found in all parts of the cerebral hemispheres, in the corpus striatum, the optic thalamus, the pons Varolii, the cerebellum, and the medulla oblongata. There has been one abscess, or several collections of pus have been discovered. The abscess has been surrounded by cyst-walls of some thickness; or there has been no inclosing capsule, but merely disorganized brain-structure. According to Rokitansky, the recent abscess consists of an irregular cavity in the parenchyma of the brain; the walls being composed of suppurating cerebral tissue, sloughing shreds of which hang into the collection of pus, while the brain all around is in a state of inflammation. The pus in such cases is thick and greenish, and has a fetid phosphorescent odor.

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* The two following remarkable instances serve well to exemplify the obscurity which surrounds some of these cases:

1. A youth, aged eighteen, applied as an out-patient at the Hôpital St. Louis, on account of a purulent discharge from the ear. So little inconvenience did he feel that it was with difficulty he could be persuaded to enter the hospital. Though appearing in excellent health, death took place suddenly the next day, immediately after the occurrence of a convulsive paroxysm. At the autopsy, the petrous bone was found diseased, but the dura mater covering it had not undergone any change. The cavity of the tympanum was filled with pus, which obtained an exit both by the external auditory meatus and the Eustachian tube. All the convolutions of the left cerebral hemisphere had become effaced, while a collection of pus occupied the whole of the middle and posterior lobes of the brain. Very small abscesses were scattered throughout the anterior lobe. This patient had never manifested the slightest intellectual disturbance; and no symptom indicated the existence of cerebral lesion, until the pus, bursting into the lateral ventricle, caused instant death. Gazette Hebdomadaire de Médecine et de Chirurgie, p. 743. Paris, Novembre 15, 1861.

2. A soldier of the French line, being on parade, was suddenly seized with vertigo. He passed his musket to a comrade, staggered a moment, and dropped senseless. Carried to the hospital, he remained for some time comatose; with his limbs relaxed, his pupils dilated and immovable, and his pulse full and slow. He then fell into a series of epileptiform convulsions and died. The following history was obtained: Two years previously this man had stolen out one night from barracks, and in order to re-enter unperceived had to climb a rampart. He tumbled into the ditch, pitching on his head; but on recovering consciousness, returned to his quarters without saying a word about the accident. He continued to perform actively the duties of sergeant, and was never suspected of ill-health; nevertheless, it was remembered that from time to time he had complained of violent headaches attended with great prostration, and the sufferer himself seems to have attributed them to the fall. These headaches, after lasting from six to twenty-four hours, would pass off in a very heavy sleep. Not the slightest disturbance of intellect or locomotive power made its appearance. A few months before death the surgeon of the regiment noticed that the sergeant was much changed in appearance; the face was pale and of a *leaden hue*, and there was considerable loss of flesh. A careful physical examination produced no elucidation of the mystery. On post-mortem inspection, no external trace of wound was found upon the head, nor was there any evidence of fracture, old or recent. The veins of the dura mater were gorged, but there was no bloody effusion. The left hemisphere was much enlarged, and on palpation of its convex surface extensive fluctuation could easily be perceived. On slicing the brain, the left lateral ventricle was found distended with liquid blood, which seemed recently effused; the third ventricle was similarly filled, and a rent communicated between the two. The cerebral substance in front of the left lateral ventricle was the seat of a spherical cavity the

Although a cerebral abscess is usually soon fatal, yet when encysted it may not destroy life for some time. In a very few cases it is even possible that restoration to health has taken place; the pus-cells having undergone fatty degeneration, the fluid contents having become absorbed, and the capsule having contracted. If in any given case we sought to effect a cure our only chance would lie in enforcing mental and bodily rest: in allowing a plain nourishing diet, with plenty of milk and no stimulants; and in keeping the patient in pure air. For many months after the cessation of all symptoms care would still be needed to prevent any mischief from being again started in the brain-tissue around the cyst.

There are records of the skull having been trephined in a few cases, for the purpose of giving exit to pus; but recovery did not follow in a single instance, so far as I have been able to learn.

3. **ACUTE ENCEPHALITIS.**—This disease may be roughly described as a morbid process which gives rise to more or less complicated phenomena during life, according to its degree and the extent to which the brain and its membranes are involved. After death, traces of its power are found in the form of meningeal congestion, with effused lymph or serum or pus; an appearance of vascularity, varying from bloody points, or a scarlet tinge, to a dusky redness about the affected part of the brain; with occasionally softening, or suppuration of the cerebral substance.

Causes.—They are often difficult to detect. Inflammatory affections of the brain sometimes arise without any appreciable reason. Plethoric persons, and such as have short necks, are said to be more liable to them than others. Occasionally these attacks come on in the course of continued fever, or of measles, or of scarlatina; or they may follow upon wounds, blows, or other injuries; or they will be due to disease of the bones of the ear or of the nose, or to poisoned blood, or to intemperance; or they may be owing to suppressed evacuations. Dr. Abercrombie in speaking of the causes of encephalitis states that—"One of the most common examples of this is suppression of the menses, which in young women of unsound constitution is very often followed by dangerous affections of the brain. Headache, or any symptom in the head occurring under such circumstances, is always to be considered as requiring most minute attention."* According to my own experience, the symptoms which occur under these circumstances are much more frequently the result of anæmia than of inflammation. It need scarcely be said the distinction is of just as great importance, as is that between hydrocephalus and hydrocephaloid disease.

Symptoms.—The chief and earliest indications of encephalitis, or phrenitis [from $\Phi\rho\dot{\eta}\nu$ = the mind, with the terminal *-itis*], or meningo-cerebritis, as it is more appropriately termed, are—fever, nausea and vomiting, acute headache, sharp and hard and irregular pulse, constipation, impatience of light and sound, watchfulness, a look of oppression or sullenness, suffusion

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size of a walnut, full of blood, and communicating with the ventricle by an opening which would admit a common quill. Along with the blood in this cavity there was also found a considerable layer of concrete pus lining its walls, from which, however, it was separated by a whitish-gray pyogenic membrane. The series of events then, in this case, were: (1.) Formation of an abscess in the anterior lobe, in consequence of the blow on the head; which abscess was the cause of the intermittent headache, and latterly of the failure in general nutrition. (2.) Rapidly fatal hemorrhage into the ventricles, produced by the sudden rupture of the wall of the abscess.—Gazette des Hôpitaux. Quoted from the London Medical Review, p. 381. December, 1862.

* On Diseases of the Brain and Spinal Cord. Fourth Edition, p. 148. Edinburgh, 1845.

of the eyes, and confusion of thought or even delirium. These symptoms are most marked where the meningitis predominates.

At the end of from twelve hours to two days, the second stage of the complaint sets in—the period of collapse. The patient falls into a state of stupor; his articulation is rendered difficult or indistinct; his vision and hearing get dull; the pupil (from having been contracted to a pin's point) becomes dilated; there may be squinting, and paralysis of the muscles of the eyelids; and there are frequent twitchings of the muscles. Then the countenance gets ghastly; sordes form on the gums and teeth; and the body is covered with cold sweats. Finally the sphincters relax; and there are a few convulsive paroxysms, paralysis and profound coma, which usually soon terminate in death.

Occasionally the first symptom that attracts attention is a sudden attack of convulsion; in some cases occurring without any previous illness, at other times preceded for a few days by headache and slight complaints which have passed on unnoticed. The convulsion is generally long and severe; it may be followed immediately by coma, which in a few days is fatal; or it will perhaps recur frequently at short intervals, and pass into coma at the end of twenty-four hours. Sir Thomas Watson thinks that when nausea and vomiting are the earliest symptoms, the inflammation has had its origin in the cerebral pulp—in the substance of the brain; and that when the attack commences with a convulsion, the inflammation has started from the pia mater or the arachnoid.

In all the forms of this dangerous complaint there is a great uncertainty about the symptoms; while much observation will be necessary to put us on our guard against the insidious characters which many of the cases assume, and the deceitful appearances of amendment that often take place. Fortunately the disease is not of frequent occurrence. It either ends fatally in a few days; or the patient may struggle on for two or three weeks.

Diagnosis.—To distinguish encephalitis from the delirium of fever and from delirium tremens is sometimes difficult. The history will often throw light on the matter. In phrenitis the delirium is an early symptom, and it is usually violent; the pulse is sharp, hard, and often irregular; and there is generally sickness. In fever, the delirium is an after symptom. In delirium tremens, the soft and frequent and compressible pulse, the busy delirium or wandering, the loquacity of the patient, the trembling of his hands, and generally the ease with which he is temporarily roused to answer questions rationally, are important diagnostic signs. Moreover, as Dr. Bence Jones has shown, in acute inflammations of the brain there is an increase in the earthy and alkaline phosphates of the urine; while in delirium tremens there is a marked diminution of them. And again, in inflammation the chlorides in the urine are greatly diminished, if not entirely absent; while in the delirium from drink or exhaustion these salts are unaffected.

Morbid Anatomy.—The post-mortem appearance most commonly found is more or less vascularity of the substance of the brain; a condition indicated by the existence of numerous bloody points in the medullary portion, giving an appearance as if it had been sprinkled with red dots. In other instances the vascularity is much greater, sometimes being so excessive that the part is of a dusky red hue. There may be an exudation of pus, either upon and between the convolutions, or collected in one or more abscesses in one of the hemispheres. Softening of a part of the cerebral substance is not uncommon; the softened portions sometimes resembling thick cream, so that they are readily washed away by a gentle stream

of water. Moreover, we may have copious serous effusions beneath the pia mater and into the ventricles.

The dura mater is seldom involved in the morbid action, unless the inflammation be the result of violence. In such cases there may be deposition of false membranes between the bone and dura mater, or between the dura mater and arachnoid; or we shall find thickening of all the membranes.

Treatment.—The principal measure usually recommended is a strict observance of the antiphlogistic regimen. In other words, the practitioner has been advised to put his trust in a diet of the lowest kind, general and local bleeding, antimonials in some stages of the disease, digitalis, active purgatives, mercury, blisters to the back of the head and neck, mustard pediluvia, and the constant application of cold to the scalp after the hair has all been shaved off. With regard to venesection it has been suggested that the blood ought to be allowed to flow until a decided impression is made upon the pulse, or until the patient faints; which will perhaps happen when some twenty-four ounces have come away. Afterwards, it is said that leeches or cupping may be resorted to.

When it is remembered that encephalitis is one of the most quickly depressing and fatal diseases which can affect the human body, it may readily be imagined—from what has been already stated—that its dangers are not lessened by the foregoing treatment. And such seems really to be the case; for one of the strongest advocates of this practice, Dr. Abercrombie, in speaking of the results of a course of these so-called remedies, says: "The cases which thus terminate favorably, form, it must be confessed, but a small proportion of those which come under the view of a physician of considerable practice; but they hold out every encouragement to persevere in the treatment of a class of diseases, which, after a certain period of their progress, we are too apt to consider as hopeless." With the greatest respect for this clever physician's opinions, it rather seems to me that the extensive failure of one plan of treatment should decidedly lead us either to test another, or to hold our hands. We talk of the vis medicatrix naturæ, but it is seldom allowed fair play. Here at least is a good opportunity for trying whether this force, perhaps gently guided, may not carry a patient through a disease where the efforts of our art are notoriously so futile. If it fail, we must strive again and again, after a better course. But in such a contingency, drugs are not to be used at haphazard—on the mere chance of their doing good. And until we have more light, let us at least determine not to thwart the natural efforts at reparation, as we may easily do by acting upon the fallacious notion that the free loss of blood is well borne; neither let us credit those who assert that antimony or mercury is capable of effecting a cure in these distressing diseases. It may be said that in these observations I am combating shadows. That the treatment condemned, is that of past days. This is not so, however. A writer of great ability, in one of the most important medical works published during 1868, says that the treatment of acute meningitis can only be successful when employed very early; and that it consists of bloodletting, hard purging, and cold to the head. The patient is to be bled in a sitting posture, from a large opening in a vein in the arm; the blood being allowed to flow till syncope is induced. The bleeding is to be repeated as often as the symptoms require it, or to be followed by leeches behind the ears and to the temples. Moreover, mercury is to be so administered by the mouth and by inunction as to bring the system quickly under its influence. In alluding to these recommendations, I hope it will not be thought that I am improperly criticizing them. They are mentioned in justification of

my own remarks. Less could hardly be said, inasmuch as my distrust of violent attempts to cure these meningeal and cerebral inflammations is so great; and seeing also my belief that we may do good if we can but be contented with prescribing for the urgent symptoms as they arise,—endeavoring to calm excitement by sedatives, to lessen increased heat of body by diluents and tepid sponging, to prevent accumulations in the intestines by purgatives, and to diminish maniacal delirium by the application of cold to the head.

Active cathartics of calomel and jalap, followed in three or four hours by an aperient draught, are often deemed indispensable (F. 140, 159). The compound decoction of aloes (from one to two ounces), repeated once or twice, forms a favorite remedy with me; or simply such a saline aperient as F. 152 may be recommended. Croton oil (F. 168) is a most valuable purgative in some of these cases where there is obstinate constipation. Dr. Abercrombie rather illogically says (*Opus jam citat.*, p. 153): "Although bloodletting is never to be neglected in the earlier stages of the disease, my own experience is, that more recoveries from head affections of the most alarming aspect take place under the use of very strong purging than under any other mode of treatment."

The application of cold to the head, after it has been shaved, is a remedy of importance. Pounded ice in a bladder, or a cold evaporating lotion (F. 273), or especially the pouring of cold water in a stream upon the vertex of the head, will best effect our object of reducing the temperature and calming excitement. By the cold douche, used with discretion, a strong man in the highest state of maniacal delirium may often be subdued in almost a few minutes; but it must be particularly remembered that this practice, if long continued or too often repeated, has a very depressing influence. I feel bound to add this caution, having seen the imprudent use of both the ice-bag and the cold douche productive of mischief.

With regard to medicines for directly modifying the morbid action, I know only of one on which the least reliance can be placed, and that is the iodide of potassium. Of course, the use of this drug is imperative where the diseased action is in any way connected with the poison of syphilis. But I have also seen this salt of iodine, in doses of three to eight grains repeated every four or six hours, do so much good in a few apparently hopeless cases where no evidence of venereal infection could be obtained, that I think it ought to be tried. I have, of course, often found it fail; but in my hands it has never done mischief. The iodide of potash may often be advantageously given at the same time that stimulants are being cautiously employed.

When, from exhaustion of the nervous force, an extreme degree of collapse sets in, the only chance of rescuing the patient will consist in the administration of stimulants and nutriment; such as ammonia, spirit of ether, milk, raw eggs, strong beef tea, wine, or brandy. In all stages of this disease the practitioner ought to watch his patient almost hour by hour, must ascertain that he is kept dry and clean, and will have to be careful that the bladder does not become overdistended.

Should the disorder happily yield to these measures, great attention will be requisite for some time (especially with regard to diet and the avoidance of all excitement) to prevent a relapse.

4. CHRONIC ENCEPHALITIS.—This is a disease which may follow an attack of acute meningo-cerebritis, or it can come on independently as the primary disorder. The term *chronic* is used not merely in the sense

of prolonged duration, but also as implying a series of symptoms of a subacute character.

The phenomena presented by chronic encephalitis are singularly diversified; but they may be briefly said to be commonly allied to those which mark the commencement of insanity. Hence, we find either great mental excitement or depression. Some absurd whim exists, to gratify which everything must be sacrificed; and the patient believes that he is either about to make a fortune, or to become a parish pauper. Amongst the general symptoms, hesitation in speaking or a slight stammering, a stiffness of some of the muscles, noises in the ears, troublesome headache, vertigo in walking, loss of appetite, constipation, and irregularity of the pulse, are perhaps the most prominent. As the disease slowly progresses, however, the evidences of cerebral disorder become fully developed; the memory fails, the external senses get impaired, there is a constant tendency to somnolence, paralysis shows itself, and the general health completely breaks up.

The symptoms of chronic inflammation of the meninges in aged persons are obscure. The mental faculties are dulled, there is a loss of all vivacity and energy, the speech is somewhat indistinct, and the gait is tottering. Constipation, giddiness, noises in the ears, headache, and fits of irritability are common. But there is nothing in all this which can lead to a positive diagnosis. The indications are those of some cerebral mischief; but whether it be inflammation, softening, œdema, &c., can scarcely be determined. The patient gradually passes more and more of his time in bed; sores are very apt to form upon the sacrum; and death at length occurs from exhaustion. A subsequent examination reveals opacity and thickening of parts of the arachnoid, with probably a similar condition of the pia mater. The serum in the ventricles may likewise be much increased in quantity.

Chronic encephalitis sometimes runs its course in a few months, or it may last for years. In our treatment we can only attempt to combat the symptoms as they show themselves, while trying by judicious hygienic measures to support the general health. Stimulants usually do harm, and so does tea or coffee. For all of these, milk proves an admirable substitute; and particularly is this the case with the aged. Repeated small blisters behind the ears, the use of a seton in the nucha, and perhaps the free inunction of the shaved scalp with the iodide of potassium or red iodide of mercury ointment, may be of some utility. The state of the bowels, as well as of the uterine functions in women, ought to be looked to. In the advanced stages, the patient ought to lie on a water-bed, exhausting and troublesome sores being easily produced by any unequal pressure upon the nates and sacrum. The catheter will also have to be used in many instances.

5. ŒDEMA OF THE BRAIN.—Congestion of the brain and its membranes may give rise to different conditions, which either prove transitory or become developed into serious maladies. The feverish attack sometimes spoken of as "brain fever" is one of the simplest effects of congestion: an apoplectic fit, or a so-called paralytic stroke, must be regarded as among the most grave. In the latter class we have also to place œdema of the brain, a condition which will be either acute or chronic. The cerebral substance becomes infiltrated with serum; and this freely exudes on section being made. A higher degree is marked by the brain-substance being converted into a soft diffluent pap. Examples of *acute œdema* are observed in cases of tubercular meningitis, when the cerebral matter around the lateral ventricles (which are full of serum) is found in a pulpy condition, as also in the tissue surrounding cancerous or fibrous tumors, or patch

of inflammation. The effusion, when rapidly developed, proves fatal by its pressure; in other instances it soddens the affected parts, causing these portions of the brain to soften and break down.

Chronic œdema of the brain is ofttimes met with, especially in advanced life. It occurs, like the acute variety, as the result of persistent venous congestion. This congestion has its origin in some impediment to the circulation, such as may be produced by a dilatation of the right side of the heart, with diminution of power and valvular competency; or by pulmonary emphysema, chronic asthma, infiltration of part of the lungs with fibroid material or with tubercle, chronic renal disease with albuminuria, &c. The symptoms are those of cerebral compression. They come on in a tardy and very gradual manner, especially where the brain has lost some of its volume by previous atrophy. The intellectual faculties are blunted, and at length get more or less abolished; there is muscular weakness, which increases until the patient is bedridden; while the general sensibility becomes more and more torpid. Frequently there is drowsiness during the day; often followed at night by a continued babbling of sentences without meaning, carried on in a low tone of voice.

Cases of chronic cerebral œdema are to be seen in the infirmaries of most workhouses. The sufferers are helpless, quiet, and uncomplaining; they give some little trouble, as it is necessary to keep them dry and clean, and generally to feed them. They require nourishing food, of a kind which can be easily digested; while a brisk aperient draught ought to be given every three or four days to relieve their constipated bowels. The effect of a few loose stools on the mental faculties is often remarkable. The pressure on the brain gets lessened by absorption of some of the serum; so that the individual seems to wake up, and in some measure to become himself again. His old feelings and failings partly return, and he may get angry and almost violent if thwarted. This change is of brief duration. The effusion continuing, the symptoms produced by the pressure gradually reappear. Every now and then death seems to happen rather suddenly; when it is usually registered as due to serous apoplexy. In other instances there is progressive enfeeblement of the functions of the nervous system. Attacks of quiet delirium supervene; leaving the patient imbecile, and almost deprived of voluntary muscular power. Then follows an interval of mere animal life. Perhaps for two or three days a feeble circulation and respiration alone continue, with occasional involuntary twitchings of the muscles of the face and limbs. And then life ceases; the fragile connecting link being so gently severed that those around the bed are doubtful if all is over.

6. SOFTENING; INDURATION; TUMORS.—The results of these different morbid states are of great importance. With regard to *softening of the brain* there are three varieties, which are respectively known as white or atrophic softening, red softening, and yellow softening.

White or atrophic softening (ramollissement non-inflammatoire) is that form in which the cohesion of the cerebral texture becomes loosened and lacerated by an interstitial exudation of serum. It occurs in the white substance of the hemispheres. The affected part may only have its consistence slightly lessened, or it will perhaps be rendered as diffluent as cream. The softening is the consequence of imperfect nutrition, or of the strength of the brain-tissue being exhausted. Either because sufficient healthy blood does not reach the affected parts, or because the latter are no longer capable of repair, degeneration sets in. Hence the subjects of this condition are in general weakly individuals advancing towards old age; while

they sometimes are suffering from renal or cardiac disease, or from disease of the coats of the cerebral and other arteries. It has been already pointed out that the detachment of small fibrinous deposits from the valves, or interior of the left side of the heart, and their circulation with the systemic blood until they become arrested in one of the cerebral arteries, may (by impeding the transit of a due quantity of blood) lead to imperfect nutrition, and hence to softening.

Red softening or acute ramollissement has long been regarded as one of the terminations of the inflammatory process, although recent researches have cast much doubt upon this view. Indeed, it seems much more probable that the cause of this form is the sudden withdrawal of blood from the affected part by the abrupt obstruction of an artery. This variety of softening is met with in either the gray or white substance of the brain; it may be slight and partial, or diffused and extensive; it may render the affected tissue pulpy, or so thin that it can be poured away, merely leaving an irregular cavity, while the color of the softened structure is found to vary from a brown or purple to a rosy hue.

The third form or *yellow* softening occurs as an idiopathic disease in circumscribed patches. According to Rokitansky,* at the affected part (which varies from the size of a bean to that of a hen's egg) the cerebral substance looks as if converted into a moist tremulous pulp, of the color of sulphur. When cut across it rises above the level of the section, while a nearly clear yellow fluid oozes out. To the naked eye no trace of natural structure is presented. The transition from healthy to diseased tissue is somewhat abrupt, there being no reddening or vascularity around the morbid part. The most frequent seat of yellow softening is the cerebrum, the fibrous structure and the central masses of gray matter being both attacked. It is very rare in the periphery of the brain. This species of softening may be found surrounding a patch of inflammation, an apoplectic clot, or any adventitious product. It is most common in middle and advanced age; and it runs a rapidly fatal course. Rokitansky looks upon the theory which ascribes the origin of yellow softening to inflammation as quite untenable.

The general symptoms of cerebral softening are,—more or less severe and persistent pain in the head, with attacks of vertigo coming on suddenly and soon passing off. There is a diminution of intellectual power, an embarrassment in answering questions, depression of spirits, and a susceptibility to shed tears on the slightest excitement or emotion. Prickings and twitchings of the limbs are common: sometimes there is pain and ofttimes numbness. A tendency to stupor, especially after food, is not uncommon; and there is often more or less impairment of vision and hearing. In the red variety the symptoms are of a more acute character. The headache is very severe, at times preventing sleep during the night: the limbs are frequently the seat of painful cramps, stiffness, or contractions, and the general sensibility is heightened.

The second stage of either of the forms of cerebral softening may end suddenly in a fatal apoplectic seizure, in convulsions, or in delirium. But in more chronic cases there will often come on paralysis of a limb, or of one-half of the body, with all the usual phenomena attendant on such a state. Thus, there is a loss of power in the affected limbs; questions are answered slowly, and the patient has a difficulty in making himself understood; there is great general feebleness, with a weak and intermitting pulse; there will usually be attacks of sickness and constipation; and there is a difficulty in emptying the bladder, while the stools are passed involuntarily.

* A Manual of Pathological Anatomy. Vol. iii, p. 419. London, 1850.

Then the respiration gets labored, towards the last becoming stertorous; and a state of coma comes on, which may perhaps pass off in a day or two, but only to return and become more profound, until it ends in death. Although softening can occur at any period of life, it is most common after the fiftieth year.

In one of his clinical lectures Dr. Brown-Séquard related some interesting examples of *softening of the cerebellum.* He alluded to the great variety of symptons present in these affections, and pointed out the chief differences between cerebral and cerebellar inflammatory ramollissement. In all except two of his cases there was a fixed pain at the back of the head, and generally on the side corresponding to the diseased hemisphere of the cerebellum. Amaurosis occurred complete in both eyes in two of eleven instances, though the disease only existed in one-half of the cerebellum: in one case there was loss of sight only in the right eye, with disease of the left half of the cerebellum. Hemiplegia was complete in two cases, incomplete in one. Paraplegia existed in only two. The other symptoms were a tendency to walk backwards, tottering gait, vertigo, an emotional and semi-convulsive agitation of the limbs, obtuse hearing, and aphonia. Vomiting existed in none, though it is frequent in other diseases of the cerebellum. No two of the cases recorded were alike, but all showed great differences from cerebral softening. There were none of the referred or local sensations or pains in the paralyzed limbs which are so characteristic of the red cerebral softening. The various kinds of involuntary movements were absent, while there was no muscular rigidity. No irregularity of pulse was noticed, either as regards rapidity or strength.

Induration of the brain (sclerosis) is found in its most marked degree in connection with cerebral atrophy. The whole brain may be affected, or only portions. This increase of consistence has been detected in epilepsy, rickets, and after death during some of the continued or eruptive fevers. The whole cerebral mass may become as tough as leather. In other instances, the indurated portion is of small extent, presenting the appearance of wax, or of white of egg boiled hard. The change is probably due to a great increase of the albumen.

Tumors—both simple and malignant, *deposits of tubercle, blood-clots, cysts, abscesses, chalky concretions, syphilitic gummatous growths,* as well as *cysticerci* and *hydatids,* have also been found in the brain. Primary *cancer* of this organ is a very rare disease: it is perhaps more common in males than females, and occurs more frequently between the thirtieth and fortieth years than at any other age. *Gliomata* are growths formed by a localized hyperplasia of the neuroglia—as the interstitial connective tissue of the brain and spinal cord has been named by Virchow. A microscopical examination of neuroglia shows that it consists of a fibrillated substance, in the meshes of which are cells of different shapes; many of these cells resembling colorless blood-corpuscles. The glioma is an overgrowth of this tissue. The tumor is vascular, and generally solitary; it will be either soft or hard, and it may be of the size of a walnut or even larger.

The indications of either of the foregoing occurrences are usually very obscure, varying with the situation of the morbid product, its size, and the condition of the nervous tissue around it. Probably the most common symptoms are headache, sickness, giddiness, an unsymmetrical state of the pupils, mental depression with confusion, partial paralysis, and epileptiform convulsions.

The coats of the cerebral arteries occasionally become affected with fatty degeneration (*atheroma*); with calcareous infiltration (*ossification*); or with uniform dilatation of all their coats, causing *aneurism.* One or more of

these vessels may also get obstructed from local coagulation of fibrin (*thrombosis*); or in consequence of a coagulum being carried from a distant part and getting impacted there (*embolism*).

7. TUBERCULAR MENINGITIS.—Acute inflammation of the brain is a very common disease of early life—of children under five years of age. It rarely occurs, however, in such as are previously healthy: where it does so, it may be regarded as simple encephalitis. When it is the result (as it most frequently is) of tubercular deposit in the brain or its membranes when it occurs, in fact, in scrofulous children, it is then known as tubercular meningitis. Formerly the name of acute hydrocephalus was given to this disorder; but this term was evidently badly chosen, since it referred only to one of the possible results of the disease, not to the disease itself.

Symptoms.—The symptoms of tubercular meningitis are various and uncertain. For convenience, they may be arbitrarily considered as exhibiting three stages. The *first* or *premonitory stage* is attended with indications of malnutrition; and there are more or less perfect signs of the strumous diathesis in the child or its parents. There is often a short and dry cough with much peevishness, intolerance of light and sound, headache, giddiness, and other warnings of cerebral congestion. In addition we notice general fever, presenting exacerbations and remissions at irregular periods. The skin is hot; the appetite capricious—sometimes bad, sometimes voracious; the tongue is furred, and the breath offensive; there is often nausea and vomiting; and the bowels are disordered—generally constipated. The child is drowsy, yet restless; he sleeps badly, moans or grinds his teeth, screams and awakes suddenly in alarm without any apparent cause; while often there is delirium.

At the end of four or five days, the disease, if unchecked, passes into the *second stage;* when its nature becomes very apparent, and a cure almost hopeless. The child only wishes to remain quiet in bed; his countenance is expressive of anxiety and suffering, and is alternately flushed and pale; the eyes are closed, and eyebrows knit; and he is annoyed by light or the least noise. If old enough to reply to questions, the little one complains of headache, weariness, and sleepiness; crying out frequently, "Oh, my head!" As this stage advances, the pulse—which has hitherto been rapid—becomes irregular and diminished in frequency, often falling in a few hours from 120 to 80; the slightest exertion, however, at once accelerates it. Moreover, a remarkable remission of all the symptoms may now take place, so that pain ceases, while the general condition improves. But the amendment is not of long duration. Stupor and heaviness gradually come on; there is often squinting; the helpless patient lies on his back almost in a state of insensibility, perhaps picking, with tremulous fingers, his nose and lips; convulsions frequently occur, with now and then paralysis; while, at the same time, the faeces and urine are passed unconsciously. The latter is now and then albuminous.

The transition to the *third stage*, at the end of a week or two, is not unfrequently effected very gradually by the drowsiness passing into profound coma, from which it is impossible to rouse the child; while the pulse gets feeble, the extremities lose their warmth, and a cold clammy sweat breaks out over the body. In other instances the child becomes comatose quite suddenly; immediately afterwards being attacked with paralysis and convulsions, which often put an end to the painful scene. Occasionally, however, death does not occur until the lapse of several more days.

M. Bouchut was the first to make use of the ophthalmoscope in the diagnosis of tubercular meningitis; and he asserts that in some cases, but not

in all, characteristic appearances may be observed before the convulsive period sets in. These are—(1) Peripheral congestion of the papilla, with spots of congestion in the retina and choroid. (2) Dilatation of the retinal veins around the papilla. (3) Varicosity and flexuosity of these veins. (4) Thrombosis of the same. And (5) in some instances, retinal hemorrhages from rupture of the veins.*

When tubercular meningitis occurs in the adult, there will generally be found a history of previous lung affection; which affection seems to become ameliorated as the cerebral disorder sets in. The symptoms may early assume an apoplectic or a convulsive form. More frequently they come on gradually with vomiting, slight fever, and most acute pain in the head; the patient seems unable to collect his thoughts, and is peevish and irritable, desiring only to be left quiet; there may be mutism and somnolence; and the pulse is irregular and feeble. In the second stage the depression increases, there is greater mental dulness or delirium, and there are clonic or tonic spasms. Then in the third stage the sphincters relax; while there is increasing stupor and paralysis, followed by death.

Post-mortem Appearances.—Those usually discovered consist of traces of inflammation of the membranes of the brain; especially effusion of serous fluid beneath the arachnoid and in the meshes of the pia mater. False membranes are usually observed between the arachnoid and pia mater at the base of the hemispheres. The cerebral substance often contains scrofulous tubercles; while granular tubercular deposits may be seen scattered upon and between the membranes, and especially in the pia mater lining the fissure of Sylvius. But the characteristic morbid appearance consists of softening of the central parts of the brain, with effusion of thin watery serum into the ventricles. In the majority of cases tubercular matter is found in the lungs, or in the glands of the mesentery.

Treatment.—The treatment of tubercular meningitis has always been said to be beset with difficulties; inasmuch as, being an inflammatory affection, it was thought to demand remedies which the patients (strumous subjects) could not bear. Fortunately the difficulty is abolished, if the observations made in the preceding pages are at all sound. For my own part, having long acted upon rules deduced from these doctrines, I can express my firm belief, that the more we act up to their spirit, and the less we deplete in this disease, the greater the chance of the ultimate recovery of our patient. It is only fair to mention, however, that several authors agree that lowering measures are not to be had recourse to under the present circumstances without great consideration; that if there is much doubt, the practitioner should first try the effect of a strong purgative; and that if it be necessary to take blood, local bleeding (by leeches) will generally answer every purpose. At the same time, these gentlemen forget that it is impossible to effect local bleeding, in the sense intended.

In almost all instances two or three doses of some purgative are very useful; and I think perhaps that most good is derived, especially at an early stage, from such as contain or consist of mercury. After the bowels have freely acted, I am in the habit of trusting to the iodide of potassium; which is administered in doses varying from half a grain to three or four grains, every four or six hours. The employment of cold to the scalp is likewise an important remedy. A piece of muslin or thin rag wetted with cold water, or with an evaporating lotion (F. 273), laid on the child's head and frequently renewed, will prove soothing.

When the infant is teething, many practitioners resort, as a matter of

* Gazette des Hôpitaux, pp. 225, 469. Paris, May 15th, and October 9th, 1862.

course, to scarification of the gums; unmindful of the fact that the irritation often arises from the passage of the tooth through the bony canal of the jaw, rather than from pressure on the gum. Such practice is a piece of barbarous empiricism. On the other hand when the gum is really tender and hard and swollen, then the use of the lancet gives great relief. Supposing that the vital powers become much depressed, either from the course of the disease or from the action of the remedies, stimulants must be freely had recourse to. I have frequently given a child of from six to twelve months old a teaspoonful of equal parts of port wine and water, or of port wine and beef tea in the same proportions, every hour, or every second hour, with the greatest advantage. Cream is also useful; and so is the essence of beef, or simply raw meat (F. 2). If physic be preferred, some ammonia or a mineral acid, with spirit of ether, may be ordered.

8. HYPERTROPHY AND ATROPHY.—*Hypertrophy* of the cerebral hemispheres has once in a way occurred during childhood, but in the majority of recorded cases the individuals have been between 20 and 30 years of age. In some instances, the skull increases in size as the brain itself becomes overdeveloped; and then there may be an absence of all symptoms, until perhaps death takes place in a sudden attack of convulsions. But if the bony case does not become enlarged, indications of compression necessarily ensue; and hence there will be mental disturbance varying from slight dulness of intellect to complete idiotcy. The other prominent symptoms consist of paroxysms of headache, attacks of vertigo, impairment of the power of motion ending sometimes in general paralysis, an unaltered or very slow pulse, and more or less severe epileptic convulsions. Death will perhaps occur during one of the latter attacks, or in a state of coma coming on subsequently.

The opposite condition, that of *atrophy*, may vary from a complete absence of the cerebral hemispheres incompatible with extra-uterine life, to a simple incomplete development of certain convolutions above the ventricles. When the atrophy exists only on one side, life may not be interfered with for a long time. Andral states that he has seen cases of the following kind: Above the lateral ventricle of one side there has been no nervous substance, the arachnoid usually covering the convexity of the hemispheres, being found in apposition to that which should line the parietes of the ventricles; while these two folds of one and the same membrane have been separated from each other by an areolar tissue, provided with a great many vessels. He mentions one remarkable instance where this alteration seems to have commenced twenty-five years before death; the latter being produced by an attack of peritonitis. Up to the last moment there was a perfect preservation of intelligence; although the autopsy revealed no trace of nervous substance between the meninges and the ventricles on the right side.

II. CHRONIC HYDROCEPHALUS.

Hydrocephalus [from Ὕδωρ = water + κεφαλή = the head], or dropsy of the brain, is met with in children at various ages, as the result of a great variety of circumstances. When congenital, as it often is, we generally find it associated with some cerebral malformation. It is sometimes the result, never the precursor, of tubercular meningitis; so that this latter affection

used to be spoken of as *acute hydrocephalus*. When the dropsy is congenital, or when it arises slowly from constitutional causes, it is termed *chronic hydrocephalus*.

The head attains a very great size in this disease, the unossified sutures readily yielding to the pressure of the liquid. One side of the cranium is now and then larger than the other, the bones are mostly thin and transparent, while the membranes of the brain are thickened. The serum is usually contained in the lateral ventricles, which are often expanded into one large cavity; but occasionally it is collected in the sac of the arachnoid, when it may compress the brain to a remarkable extent. The quantity of the fluid varies from two or three ounces to as many pints. In the well-known history of a man named Cardinal, it is reported that the head measured in circumference thirty-three inches; while after death nine pints of water were found in the cavity of the arachnoid, together with one pint within the ventricles.

The bodily functions are frequently but slightly impaired, occasionally not at all, till a short time before death; while it is remarkable also how little the mental powers are affected in some subjects. Heberden has related an instance where there were no signs of dropsy of the brain during life, and yet eight ounces of fluid were found in the ventricles after death. Although essentially an affection of childhood, yet cases are recorded in which it has affected adults. Thus, amongst others, the celebrated Dean Swift suffered from it. According to Dr. West, almost every example is fatal. Professor Gölis, of Vienna, affirms, on the contrary, that of the cases which commenced after birth, and which were seen and treated early by him, he saved the majority.

The *causes* of this affection are obscure. The children of drunken, scrofulous, or syphilitic parents seem most likely to be sufferers from it. Exposure to cold, insufficient nourishment, breathing impure air, blows upon the head, the sudden retrocession of cutaneous disease, dentition, intestinal worms, tubercular deposit on the membranes of the brain, or the extension of inflammation from the petrous portion of the temporal bone, may all be regarded as likely to excite it. In some instances it has followed the eruptive fevers—especially scarlatina and measles.

The *symptoms* generally begin to show themselves before the infant is six months old, in cases where they do not exist from birth. Although the child takes its food eagerly, it does not thrive; and consequently, after a few weeks, the marasmus becomes extreme. The wasted appearance of the body makes the increased size of the head the more remarkable; so that he who has once noticed the small face with the prominent heavy forehead, the protrusion and downward direction of the eyes, and the extended globular cranium with its open sutures and fontanelles, needs no pen-and-ink sketch of the hydrocephalic infant to fix the features upon his memory. The intelligence may (as before mentioned) be unaffected, although often it is much enfeebled; there is great irritability and peevishness, a morbid susceptibility to noise and light, ofttimes a liability to epilepsy, while the muscular weakness is occasionally very great. A peculiar rolling movement of the eyeball can often be noticed, and there may be strabismus, with occasionally amaurosis. Recurring attacks of headache and nausea seem particularly troublesome; there is constipation, with dark-colored offensive stools, and pains about the belly, and there is grinding of the teeth during sleep, with frantic screams on awaking. Moreover, the position of the head, often drooping helplessly on one side, is remarkable; this being due to the muscles and vertebræ being too weak to maintain it in the erect position.

During the second stage there is generally more stupor, great pallor, a slow pulse, and dilatation or contraction of the pupils, while the little fingers are constantly picking the nose and lips. When the disease is about to terminate favorably, the lethargy, pallid hue of skin, and irritability gradually subside, and then a desire for food is evinced, the muscular power increases, and the emaciation gets less marked. But in other instances excessive prostration sets in, the pulse becomes rapid, there may be paralysis and coma or convulsions follow, which end in death.

With regard to the *diagnosis*, care must be taken to distinguish dropsy of the brain from *spurious hydrocephalus* or *hydrocephaloid disease*. Weakly children are especially the subjects of this latter morbid condition; which produces heaviness of the head, drowsiness, great languor, unhealthy stools, alarm at slight noises and at strangers, freaks of temper, irregular breathing, and coolness of the skin. Above all, the surface of the fontanelle is found depressed, whereas it is prominent in dropsy. If these symptoms are insufficient to teach the practitioner the difference between the two disorders, the treatment will show him how little they are allied to each other. Purgatives, diuretics, and all the salts of iodine will rapidly increase the severity of the symptoms in spurious hydrocephalus, which disease imperatively demands the administration of pure milk, beef tea, perhaps raw meat, steel or bark, and port wine or brandy in arrow-root.

Many plans of *treatment* have been practiced in hydrocephalus with a small amount of success. The favorite remedies appear to have been purgatives, bloodletting, blisters and mercury to salivation. The cases which have come under my own care have occurred chiefly in hospital practice, and I have trusted to gentle aperients, plain but nourishing food, cod-liver oil or glycerin, with sometimes iodide of potassium or iodide of iron. As regards the iodide of potassium, I can only say that my faith in its efficacy yearly increases; but to do any good, it ought to be freely given (one grain every six hours to a child one year old), while it must also be persevered with for a few weeks, or perhaps even for two or three months.

The course advocated by Professor Gölis, after great experience, consists in the administration of calomel in quarter or half-grain doses twice daily, together with the inunction of one-eighth or one-fourth of an ounce of the mild mercurial ointment (Phar. Lond., 1836) into the shaven scalp once in every twenty-four hours. At the same time the head is to be kept constantly covered with a flannel cap, to prevent all risk of the perspiration being checked. If no improvement be perceptible after a lapse of six or eight weeks, diuretics (the acetate of potash, or tincture of squills, or both) are to be combined with the treatment, and an issue may be made in the neck or on each shoulder, to be kept open for months. When convalescence is once established, he thinks benefit is derived from small doses of quinine—a quarter of a grain three or four times daily.

Two remedies—*compression* of the head, and *puncturing* it—have been strongly advocated by several writers. Compression is well effected by bandaging; or, better still, by the methodical application of strips of adhesive plaster over the whole of the cranium, so as to make equal pressure on every part. In cases where there are no symptoms of active cerebral disease, pressure will probably do good; and from my own experience I am inclined to think favorably of it. Puncture is performed with a small trocar and canula at the coronal suture, about an inch and a half from the anterior fontanelle, so as to avoid the longitudinal sinus. The fluid ought to be evacuated slowly, as much as will flow being allowed to come away; while gentle pressure must be kept up both during it

escape, and afterwards for some weeks. This operation is only to be had recourse to when other means have failed. It has occasionally proved successful in very young children.

Sir Thomas Watson mentions two hopeless cases successfully treated on a plan suggested by Dr. Gower.* Ten grains of crude mercury were rubbed down with twenty grains of manna and five grains of fresh squills. This formed a dose which was taken every eight hours, for three or four weeks. It caused a profuse flow of urine, great debility, and emaciation; but there was no ptyalism. When the symptoms of hydrocephalus had disappeared, the health was restored by the exhibition of steel.

The foregoing remarks show the necessity of attending to *prophylactic* measures. A child with any tendency to hydrocephalus should be reared so as to strengthen its system as much as possible. Accordingly, care is to be taken that it has sound sleep at night; it ought to have a nourishing diet, with animal food and as much milk as can be fairly digested; a salt-water tepid bath had better be used every morning, followed by friction of the skin; the nursery and bedroom are to be properly ventilated; and plenty of exercise is to be taken in pure air. In some instances, residence at the seaside, with the administration of cod-liver oil, may be needed. Stimulants had better always be avoided. And then only the most gentle attempts at education are to be permitted; the lessons being made short, of a varied character, and as interesting and little fatiguing as possible. The child is almost certain to be precocious; and often will be only too happy to overwork its brain, if permitted to do so.

III. APOPLEXY.

By the term Apoplexy [Ἀπὸ = from, or by means of, + πλήσσω = to strike,—because those attacked fall down as if from a blow] is meant a fit of sudden insensibility. There is a complete loss, for the time, of consciousness and sensation and power of voluntary motion; together with a more or less severe disturbance of the functions of respiration and circulation. It is a state of coma occurring suddenly from pressure upon the brain; the compressing power having its seat within the cranium.

There is a popular belief that patients suffer from three different attacks of apoplexy; the first being mild, the second followed by paralysis, and the third ending in death. Without subscribing to the literal truth of this conceit, it can at all events be allowed that the danger greatly increases with each attack.

Causes.—Whatever tends to induce cerebral congestion may produce apoplexy; and therefore amongst the causes we must set down the immoderate use of intoxicating drinks, tobacco, and opium. These agents can act as direct provocatives of a fit, or indirectly by inducing disease of the nervous or vascular structures. Great heat or cold, sudden excitement, mechanical violence, plethora from the sudden suppression of an accustomed hemorrhage, and in short anything which tends to produce congestion and to lower the tone of the capillaries, will possibly give rise to an attack.

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* Principles and Practice of Physic. Third Edition, vol. i, p. 458. London, 1848.

In the greater number of instances some disease of the cerebral blood-vessels is found. Fatty degeneration of the arterial tunics is perhaps the most common: but there may be ossification or calcification, or some intracranial aneurism. The cerebral blood-vessels are more apt to be the seat of aneurism than is generally believed: but to detect such, after rupture, will often require a cautious dissection. Cases of renal disease not unfrequently end in apoplexy, the same degeneration of the coats of the vessels occurring in the brain as in the kidney. Hypertrophy of the left ventricle of the heart, independently of valvular affection, may cause a fit: owing to the blood being propelled with greater force than the vessels can bear. This hypertrophy often exists in combination with granular degeneration of the kidneys. So also valvular disease of the heart, ossification of the aorta, the pressure of an overloaded stomach, &c., can all be the source of a seizure by offering an impediment to the natural circulation of the blood.

Diagnosis.—It is often a matter of difficulty to discriminate between apoplectic coma, and that due to a narcotic poison or to drunkenness. The distinction is most important as regards the treatment. The coma is profound in each instance, though arising from so different a cause: the history of the case, the general appearance and age, and the presence or absence of the odor of spirits in the breath, are the points which chiefly help to solve the embarrassment.

Speaking generally, it may be said that in intoxication the person may often be momentarily roused, so as to give an intelligible answer to a distinct question; though of course if he be dead drunk, he is as senseless as a mass of inanimate matter. The pulse is frequent; but in deep alcoholic coma it will be found infrequent and small and labored. The respirations are perhaps slow: stertorous breathing is either absent or not loud. The pupils may be contracted or dilated, though the latter appearance is most common. The face is either flushed or pale. The power of motion is impaired or entirely abolished; as is sensation. Reflex action is often absent. The characteristic odor of alcohol is appreciable; though implicit reliance must not be placed on this point, because a man who has been drinking may have cerebral hemorrhage. In drunkenness the urine is frequently limpid and abundant; where a large quantity of spirit has been taken, the specific gravity of this secretion may even be found to be below that of water. According to Dr. Anstie the presence of a poisonous dose of alcohol in the system can be determined, if the addition of one drop of the urine to fifteen minims of the chromic acid solution turns the latter immediately and decidedly to a bright emerald green color. This chromic acid solution is made by dissolving one part of bichromate of potash in three hundred parts (by weight) of strong sulphuric acid. As regards poisoning from opium, contraction of the pupils is not always present in the advanced stage. Nitrobenzole has caused several deaths, in four or five hours, after giving rise to symptoms resembling those of drunkenness, followed by sudden coma. The peculiar smell of the poison causes it to be easily recognized. In apoplexy the patient cannot be roused; the pulse is infrequent and slow, rather than frequent and quick; the pupils are perhaps unequal; and the stertor is often well-marked.

So many cases of apoplexy occurring in the streets have been mistaken for intoxication, that no person found insensible by the police (whatever the *supposed* cause may be) ought to be placed in a cell until a cautious examination has been made by a medical man. Even if the individual be "dead drunk," remedies are urgently demanded, to prevent fatal poisoning or apoplexy. Especially ought the stomach-pump to be employed: first, for the removal of any alcoholic fluid not already absorbed; and secondly, for

y paralyzed; or it ends in death. In the latter case, on examin-
in we find either no appearance whatever of disease; or extrav-
d is discovered; or there is effusion of serum into the ventricles
the arachnoid. Dr. Abercrombie calls the first, or that which
hout leaving any traces, *simple* or *nervous* apoplexy (uræmia?);
l is *sanguineous* apoplexy, or *cerebral hemorrhage;* the third,
plexy (cerebral œdema?). During life we are unable positively
ish, by the symptoms presented at the time of the fit, between
varieties.

ms.—This dreadful visitation is seldom experienced without some
reatenings; which properly interpreted, should put the patient
d. There are fugitive attacks of cerebral congestion; these being
y mental confusion and dulness, distension of the veins of the
emple and forehead, a duskiness of the lips and conjunctivæ, a
heat about the head with coldness of the extremities, and a
secretion of urine with constipation.

owing individuals may be said to be predisposed to apoplexy:
se ancestors suffered from it. Men and women of a peculiar
dy, of sedentary habits, accustomed to high living, with protu-
ies, large heads, florid features, and short thick necks. Individ-
ced in life, beyond fifty. A strong predisposition will also be
l by disease of the kidneys, of the heart, or of the cerebral blood-
intemperance; and by the cessation of habitual discharges.

the prodromata, such as these are the most important: (1)
and giddiness, experienced particularly on stooping. (2) A
eight and fulness in the head; with roaring noises in the ears,
ary deafness. (3) Transient attacks of blindness, or sometimes
on; and especially the formation of minute clots in the retinæ,
the ophthalmoscope. (4) Repeated epistaxis; fits of nausea;
gish state of the bowels. (5) A loss of elasticity in walking; a
lean forward; a sense of pins and needles in the feet, or a feel-
arbles or some foreign body were in the boot; perhaps with
n the limbs. (6) Loss of memory, great mental depression, and
; the use of wrong words in talking; occasional incoherent con-
indistinctness of articulation; and transient delusions. (7)
with heavy sleep, and a tendency to dreaming or nightmare.
rtial paralysis; sometimes affecting a limb, sometimes the eye-



the muscles of the limbs, sometimes on one side only." This kind of seizure is not uncommon in renal disease.

In the *second* form, the coma is not the first symptom, but complaint is made of a sudden attack of pain in the head. Then the patient becomes pale, sick, and faint; sometimes he vomits; while frequently he drops down in a state resembling syncope. Occasionally he does not fall, the sudden attack of pain being merely accompanied by slight and transient loss of consciousness. After a few hours, however, the headache continuing, he becomes heavy and oppressed and forgetful; and gradually sinks into perfect coma, from which recovery is rare. A large clot is usually found in the brain. The coats of the cerebral vessels are often diseased.

The *third* form of apoplectic seizure begins by an abrupt attack of paralysis of one side of the body, sometimes with deprivation of power of speech, but no diminution of consciousness. The paralysis may pass gradually into apoplexy; or the hemiplegia will remain without further urgent symptoms; or, in certain favorable cases, the palsy slowly goes off and the patient recovers.

Phenomena during the Fit.—The duration of the apoplectic fit varies from two or three hours to as many days; throughout which time there is total unconsciousness. The pulse, at first infrequent and small, becomes more frequent and larger and harder according as the system recovers from the prostrating shock: it usually remains less frequent than natural, and is sometimes intermittent. Respiration is slow, embarrassed, and often accompanied by stertor: perhaps the cheeks puff out with each expiration. There is frothy saliva about the mouth. In bad cases, the body gets covered with a cold clammy sweat; the face becomes pale; the eyes appear dull and glassy, with one or both of the pupils dilated and immovable; the teeth are firmly clenched; and all power of deglutition is lost, or much impeded. The bowels are torpid; or, if they act, the motions are passed involuntarily. There is either involuntary micturition, or (as most frequently happens) retention of urine, until the bladder becomes distended and overflows, as it were, causing the urine to be constantly dribbling away. When the patient recovers incompletely, more or less paralysis of the limbs usually remains.

Prognosis.—A guarded opinion must always be given. The danger at the time is great; being somewhat in proportion to the depth of the coma, the amount of stertorous breathing and puffing out of the cheeks, the degree of prostration, and the difficulty of swallowing. Where the coma has been preceded by one or more attacks of convulsions, the hope of restoration is small. Supposing the loss of consciousness to continue beyond twenty-four hours, and that there are thoracic râles with a frequent pulse, the prognosis is most unfavorable. The longer the insensibility lasts, the greater is the fear that the clot is large and the ploughing up of the nervous tissue considerable. Partial recovery having taken place, there is still a fear, especially during the first fortnight, that the hemorrhage may recur; or that the clot will act as an irritant, and set up inflammation in the nervous tissue. The more decided the hemiplegia, the greater the fear that the mischief is extensive.

Where the symptoms gradually diminish, there is first a recovery of the mental power. This may be imperfect, so that the patient becomes childish; or his memory will be impaired, so that he cannot express his wants in proper language, or he cannot read, &c. Then sensibility is restored to the affected limbs; and at a still later stage there may be a gradual improvement in the power of motion. In the latter case, the capability of

movement is first experienced in the paralyzed lower extremity, then in the arm, and subsequently in the hand.

According to Dr. Duchesne, contraction of the muscles is evidence of spinal action, increased by the persistent central mischief removing cerebral control. Flaccidity of the muscles, on the other hand, is the secondary result of long-continued inaction; this inaction having been produced by the cerebral disease. The same author has also noticed, that active tonic contraction of the muscles is indicative of inflammation in the walls of the cyst.

In fatal cases of apoplexy death does not usually happen immediately, as it occurs from heart disease, rupture of an aneurism, a broken neck, or poisoning by prussic acid or nicotin. There is almost always an interval between the fit and the cessation of life,—an interval of at least some hours. The distinction between death occurring *rapidly* and *instantaneously* is not to be overlooked. Even when blood is effused into the pons Varolii, life may continue for two or three hours.

The deaths registered in England, as due to apoplexy, during the year 1866, were $\frac{\text{Males } 5121}{\text{Females } 5176} = 10{,}297$. This is the average for the last ten years, making allowance for increase of population. Of the above total, 670 were children under five years of age. More fatal cases, in both sexes, occur between sixty-five and seventy-five than during any other decade.

Post-mortem Appearances.—It is only necessary to notice those which are discovered in cases of sanguineous apoplexy. The blood may be effused upon or between the membranes of the brain; as on the outside of the dura mater, into the sac of the arachnoid, or into the meshes of the pia mater. It will perhaps be poured into one of the ventricles, or into the cerebral substance itself. In the latter case, the blood is usually found in the most vascular parts; that is to say, in the corpora striata, the optic thalami, or in that portion of the hemispheres of the brain which is on a level with these bodies. Dr. Craigie arranges the parts which may be the seat of the hemorrhage in their order of frequency, thus: the corpora striata, optic thalami, hemispheres, pons Varolii, crura of the brain, medulla oblongata, and cerebellum.

Where death occurs within a few hours of the effusion upon or between the membranes of the brain, the cerebral substance will usually be seen simply flattened from the pressure which the extravasated blood has exerted; this blood being either liquid or coagulated. But if some days have elapsed, there will probably be evidence of meningitis as well as of softening of the convolutions. Moreover, in the latter case, the blood may be found fixed to the arachnoid by a delicate transparent membrane. Supposing the vital fluid to have been poured into the substance of the brain, a cavity (varying from the size of a barleycorn to that of a hen's egg) will be seen, containing semi-coagulated blood and softened cerebral matter. At a rather later period the clot will probably be much firmer; while the walls of the cavity may have undergone some amount of inflammatory softening. And lastly, when life has been prolonged for abouty twenty-five days, the coagulum may be discovered small and isolated, a membrane can be detected around it, and the cerebral walls of the cyst will be found to be perceptibly getting indurated. At this time, moreover, the walls of the blood-corpuscles will have ruptured through endosmosis; and the contents of these cells having escaped and crystallized, blood or hæmatoid crystals may be discovered on a microscopic examination.

The point of rupture in the vessel cannot always be made out. Where the walls of the carotid, basilar, or meningeal arteries have given way through ossification, or aneurismal dilatation, there is no difficulty in show-

ing the source of the hemorrhage; but it is not so easy if only one or more of the minute vessels have broken down, probably owing to fatty degeneration of the coats.

Treatment.—This may be divided into that which is prophylactic, and that required when an attack has occurred.

The remarks that are needed on the *prophylactic* management are few and plain. When a predisposition to apoplexy is suspected, the individual should avoid strong bodily exertion, venereal excitement, the stimulus and irritation of anything approaching to drunkenness, violent mental emotion, exposure to extremes of temperature, straining at stool, long-continued stooping, tight neck-cloths, and warm baths. He (or she) ought to observe a moderately spare diet, almost free from alcoholic drinks, heavy meals at long intervals being bad, partly because an overloaded stomach will obstruct the circulation by its pressure, and also for the reason that any sudden increase in the quantity of the blood may cause a diseased vessel to give way. Sleep should be sought with the head high, on a mattress rather than on a feather bed, in a cool, well-ventilated room, and for not more than eight hours out of the twenty-four. Daily exercise ought to be taken in the open air, but without overfatigue, while attention is also to be paid to the bowels. Washing the head in the morning with cold water is often useful; or establishing a drain near the occiput, by means of an issue or seton in the neck, will perhaps do good. When giddiness, headache, throbbing of the arteries of the head, and epistaxis are present, much benefit will result from active purging for a day or two, as well as from blistering the nape of the neck. On the contrary, where there is anæmia, small doses of steel, good easily digested food, and plenty of milk will be needed.

But supposing that *an attack has occurred*, what are we to do? Formerly the treatment of every case of apoplexy was commenced by bleeding; and statistics prove that the more freely the blood was taken away the greater was the mortality.* This is what might be expected, for we only see the patient when the mischief is done; rupture with extravasation of blood has taken place, and bleeding will not remove it. Moreover, we are seldom able to learn the cause of the fit, the nature of the antecedent disease of the cerebral vessels, or of the brain itself. When such disease is in existence, or where there is a morbid state of the heart or kidneys, will such conditions be improved by loss of blood? How are the reparative powers, the action of which is so indispensable, to be encouraged by bleeding? But, it is said, depletion will prevent further extravasation. I believe, with Mr. Copeman, that so far from doing so, it promotes it; partly by inducing greater thinness of the blood, and partly by diminishing the power of coagulation. In proof of this it is only necessary to read the reports of not a few cases, where it is distinctly stated that the abstraction of blood

* "The universal *remedy*, as it is called, for apoplexy is bloodletting; at least so generally has it been employed that of 155 cases in which the treatment is specified, 129 were bled, and only 26 were not; of the 129 who were bled, 51 recovered and 78 died,—the cures being 1 in 2½, the deaths 1 in 1⅔; of the 26 who were not bled, 18 were cured and 8 died, the proportion of cures being 1 in 1½, and of deaths 1 in 3¼. But the mortality varies a good deal according to the particular method in which bloodletting was performed. In 2 cases the temporal artery was opened; both died. In 11 cases cupping only was employed; 6 were cured and 5 died. 14 were treated by leeching; 4 cured, 10 died. 17 were bled in the foot, a plan strongly recommended by M. Portal, of which 13 were cured and 4 died. 85 were bled generally and copiously, of which number 28 recovered and 57 died; that is to say, 2 in every 3 cases terminated fatally."—A Collection of Cases of Apoplexy, p. 6. By Edward Copeman. London, 1845.

was immediately followed by an aggravation of the symptoms and by paralysis. As regards my own practice, it may be mentioned that among the several cases which formerly came under my care in dispensary and hospital practice, I never saw one in which I considered bleeding necessary; and certainly the majority of the cases, at least, recovered. The lessons then learned have since guided me in treating this disease; for I cannot recollect having met with an instance where venesection or leeching has been called for. And, moreover, the most unfavorable cases which I have seen in consultation have been those where one or the other practice has been employed.

The best rule to adopt is that laid down by Cullen,—*to obviate the tendency to death.* If the tendency be towards death by coma, if the pulse be full, or hard, or thrilling, if the vessels of the neck are congested, and if the face be flushed and turgid, then a small bloodletting may perhaps be called for. But, on the contrary, when the patient is dying from syncope,—where there is a feeble or almost imperceptible pulse, with a cold clammy skin, then bleeding will only insure a speedily fatal termination. In either case the patient ought to be removed into a cool room; he may be placed in a reclining chair, but any way the head should be raised; all the tight parts of the dress must be loosened, especially the cravat and shirt collar, and cold is to be applied to the head by means of pounded ice in a bladder. Supposing the practitioner thinks it proper to bleed, let him do so by opening a vein in the foot, as recommended by Portal, or let him take only a very small quantity of blood from the nape of the neck with the cupping-glasses.

Active purgatives are at times serviceable. If the patient can swallow, a full dose of calomel and jalap, followed by the common black draught, may be given (F. 140). Where the power of deglutition is lost, two or three drops of croton oil should be put on the back part of the tongue. Stimulating enemata (F. 189, 190, or 191) ought also to be thrown up the rectum. Pediluvia containing mustard, or sinapisms to the legs, can seldom do any harm, while their employment gratifies such friends of the patient as expect that "something" should be done. Blisters, applied over the scalp or to the neck, are to be avoided. The cathether is to be used if there be retention of urine. Some practitioners recommend emetics; but unless the attack were clearly due to an overloaded stomach, I should avoid them. Even then it must be remembered that these agents cause a determination of blood to the head, and hence their efforts must be narrowly watched.

Supposing the patient to recover from the fit, great care will afterwards be required to prevent a second attack. Strong medicines, great excitement, or much mental occupation, are to be avoided. The diet ought to be light but nutritious; milk is useful taken to the extent of a pint and a half or two pints in the day; while, as a rule, only small quantities of light French, Hungarian, Austrian, or Greek wines should be allowed.

IV. CONCUSSION OF THE BRAIN.

Concussion of the brain is signalized by fainting, sickness, stupor, more or less insensibility, and loss of all muscular power; these symptoms succeeding immediately to a heavy blow or to some act of external violence. The patient may rally quickly, or not for many hours, or he will perhaps

die suddenly or at the end of some days. After death, either no lesion of the brain can be detected, or a laceration of some portion of it will be found, or there may be discovered a general softening of its substance.

Symptoms.—These will vary according to the degree of concussion. When the shock has only been slight, the person soon recovers from the state of unconsciousness, complaining merely of confusion of ideas, faintness, sickness, chilliness, a desire for sleep and ringing noises in his ears. In a more severe case the insensibility continues longer, the patient lies as if in a deep slumber, his pupils are insensible to the stimulus of light, he is pale and cold, the muscles are flaccid, the pulse is fluttering or feeble, the sphincters are relaxed, and the breathing is often scarcely perceptible. After a variable interval, when partial recovery ensues, there is great confusion of thought, often an inability to articulate distinctly, frequently severe vomiting, and sometimes paralysis of one or other of the extremities. Even though more complete restoration take place, still the individual will never be the man he was prior to the accident. In the worst forms of concussion, the individual is felled to the ground by the shock—whatever it may be, and dies upon the spot.

The whole nervous system seems now and then to receive a bruise or jar by a *railway accident*, without any immediate indications of mischief being developed. There may be no external manifestations of injury,—no wound or abrasion, no contusion or ecchymosis. But in the course of a few days pains in the head, with nervous depression, are complained of, or some slight diminution of the power of motion will probably be noticed. There may even be an attack of epilepsy, or of epileptoid convulsions. Sometimes the sense of sight becomes impaired, or squinting may take place; or there will be deafness and troublesome noises in the ears. These symptoms perhaps persist for a longer or shorter time, and then pass off, while occasionally they prove to be the precursors of serious cerebral or spinal disease. More than once a general shake of the nervous system, combined with constitutional shock and fright, has caused death some time after the accident, and though a careful necroscopy has been made, yet the pathologist has been unable to detect any trace of mischief. These points ought all to be recollected in the examination of sufferers from railway accidents; especially when we are called upon to give evidence upon this subject in the courts of law. As Dr. Buzzard* remarks, the symptoms are for the most part "subjective." There is little or nothing which we can discern for ourselves with absolute precision. Dependence must be placed on the statements of the patients themselves. We should endeavor to test the assertions by looking at the consistency of the complaints and by regarding the statements of trustworthy friends.

Diagnosis.—The following circumstances (according to Chelius) distinguished concussion from pressure upon the brain caused by extravasation of blood: In concussion which immediately follows external violence, the patient usually recovers himself to a certain degree. In extravasation he lies in an apoplectic state, with snoring and difficult breathing; he has a hard, irregular, intermitting pulse; his pupils are widely dilated, but there is no vomiting. In conclusion the body is cold, the breathing easy, the pulse regular and small, the countenance little changed. Extravasation and concussion may, it must be remembered, occur together; but then there will be other evidence of a severe accident.

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* See an excellent series of papers by this gentleman,—"On Cases of Injury from Railway Accidents; their Influence upon the Nervous System and Results." The Lancet, vol. i, pp. 389, 453, 509, and 623. London, 1867.

There will occasionally be a difficulty in distinguishing between concussion and drunkenness. The history of the man, his general appearance, and the smell of his breath (see p. 308), are the chief points to attend to. But where there is any doubt, the practitioner had best refrain from giving an opinion, while he also keeps the patient under close observation so long as the insensibility continues.

Prognosis.—The prognosis must in all cases be made with wariness and deliberation. In every severe form of brain bruise or concussion, there is peril at first from the prostration, and afterwards from excessive reaction. Moreover, it is difficult to say at once that there is no rupture of any fibres of the brain, and no compression. These events being wanting, and the dangers of great enervation and undue reaction being passed, the convalescence is always tedious; while the shock frequently leaves behind it permanent impairment of the memory, irritability of temper, loss of smell or taste, squinting, and weakness of sight or even amaurosis.

Treatment.—It is essential that the patient be kept very quiet. Not unfrequently, this will form all the treatment a judicious practitioner can resort to. If, a few hours after recovery from the shock, the reaction seem to be intense, the head should be elevated, and cold applied: two or three drops of croton oil may also be placed on the tongue. Generally speaking, however, the depressing effect on the system is so great, that mild stimulants are necessary; and a little wine, or brandy and water, had better be cautiously administered. At the same time, while the surface remains cold, warmth must be applied by means of blankets, bottles of hot water, hot bricks, &c. In the after-management of these cases, a mild unstimulating diet, absolute rest from all mental occupation, bodily repose and quiet, perhaps with an occasional gentle bitter aperient, will alone be necessary.

V. SUNSTROKE.

Sunstroke (*Coup de soleil, Insolation, Heat apoplexy, Heat stroke,* or *Erethismus tropicus*) is a disease allied to simple apoplexy. It usually follows exposure to the direct rays of the sun, especially if the injurious effects of great heat be encouraged by unfit clothing, or exhaustion. The mortality is variously estimated at from 40 to 50 per cent. of those attacked. During the summer of 1868, the great heat which prevailed in this country for several weeks was the cause of many fatal cases of sunstroke. The persons affected were, for the most part, those engaged in field labor.

Causes.—In its perfect form it is seldom met with except in the tropics; in which region it is often fatal to the European soldier, especially at seasons when the heat is very oppressive. The more severe the regimental duty, the more the men are harassed or depressed, the more defective the commissariat arrangements, the worse the supply of drinking-water, and the more close and contaminated the atmosphere,—the more liable will the soldier be to this affection. It has been noticed that those attacked have often been affected for a few days previously with suppression of perspiration. The urine, at the same time, has been abundant and limpid; while there has been either an inability to retain it, or the desire to pass it has recurred very frequently. The nights have been sleepless; and attacks of vertigo, with a sense of weariness, have been complained of. Such men, too, may have been irregular in their habits; while perhaps they may

also been indulging freely in alcoholic drinks, and prowling about under exposure to an almost vertical sun for two or three days previous to the seizure.

Symptoms.—There is generally faintness, thirst, great heat and dryness of the skin, with prostration. In many cases, vertigo and a sense of tightness across the chest are complained of. Frequently the pulse is quick and full, but sometimes it is thin and so feeble that it can scarcely be felt. As the disease advances the heart's action becomes violent, the man can scarcely be roused, the face gets pallid, and probably an attack of vomiting ushers in the stage of coma. When the patient is comatose the skin is found very hot, the breathing is performed with difficulty, the pupils are contracted, the conjunctivæ are congested, and the action of the heart is intermittent. Just before death the pupils dilate, the respiration gets gasping, and the patient perhaps vomits.

This affection sometimes comes on very insidiously. A man will be seen to be listless and stupid; but he makes no complaint beyond saying that his head feels a little queer. Yet in twelve hours he may be dead. In several instances, after exposure to the sun, the individual has fallen down insensible, made one or two gasps, and at once died from syncope. This form of insolation is that described by Dr. Morehead as the "cardiac" variety. Mr. Cotton, surgeon of a regiment of infantry, met with twelve cases of sunstroke when at Meerut. The seizure usually happened towards evening, with symptoms of stupor and insensibility. Then followed loss of speech; burning of the skin; at first contraction, and afterwards dilatation, of the pupils; with great rapidity, hardness, and fulness of the pulse. In some of these soldiers tetanic convulsions occurred. They almost all sank very rapidly; death ensuing in the greater number within two or three hours from the commencement of the attack.

The occurrence of prolonged insensibility, convulsions, and a rapid tumultuous action of the heart, are very unfavorable indications. It is usually allowed that the patient cannot be considered free from danger until the skin gets cool and moist. In the event of recovery taking place, the convalescence will often be retarded either by deranged secretions, continued fever, persistent headache, obstinate dyspepsia, constipation, pulmonary congestion, epilepsy, or simply by great prostration of strength. Moreover, many months after an apparent cure symptoms of some obscure derangement of the nervous system or even of insanity, may set in; while if these miseries be escaped, the individual will hardly ever be as strong and healthy as he was prior to the attack.

Post-mortem Appearances.—It is seldom that any cause for the symptoms can be detected. Sometimes there is found an effusion of serum at the base of the brain; or the vessels of the membranes are turgid with dark blood. The brain itself is usually healthy. The kidneys are very often much congested; the lungs are sometimes engorged; but the other viscera present no changes of any importance. Dr. Morehead agrees with those observers who refer the phenomena of sunstroke to depressed function of the cerebro-spinal and sympathetic nervous systems.

Treatment.—The course which has often been pursued consists of venesection, cold to the head, and blisters to the back of the neck. The fatality attending bleeding has been such, that the practice is only mentioned in order that it may be unreservedly condemned. Even leeching, after the subsidence of acute symptoms, ought certainly to be avoided for the future.

The remedies upon which it is probable that most reliance may be placed are cold douches to the head and neck and chest, with the frequent admin-

istration of iced water or cold tea. Rubbing the head and body with pieces of ice, for an hour or longer, has been successfully practiced by Dr. B. Darrach, of New York. After the assiduous use of the douche, evaporating lotions to the scalp, or a bladder containing ice, may be advantageously employed. The nape of the neck can also be painted with blistering liquid—liquor epispasticus. The occasional application of ammonia to the nostrils, while the patient is being fanned, helps to restore sensibility. If stimulants are absolutely needed owing to the failure of the heart's action, the best are ammonia and brandy; given in doses proportioned to the depression, and persevered with to the last. Sinapisms or turpentine stupes to the extremities may do good. Attempts have been made to induce sweating by wrapping the patients in the wet sheet; but the proceeding has not been successful. Where the heat of the skin is great, a bath at a temperature varying between 75° and 90°, according to the state of the pulse, might prove valuable. Certainly it is most important to reduce the temperature of the body to its normal standard if possible. Dr. Edward Smith has proved that all animal foods, alcoholic drinks, and coffee lessen the activity of the skin, in the first stages of their digestion; but that tea and sugar have the opposite effect. He therefore urges that an infusion of good tea should be very freely given in this disorder; since beyond its effects on the skin it tends to directly stimulate the nervous system, and has also a powerful effect in increasing the respiratory functions. Consequently it may be found to meet three of the most urgent wants in sunstroke, viz., cooling of the body, removal of the listlessness and oppression, and increase of the respiratory action. The same writer also suggests that, as the act of vomiting tends to induce perspiration, so it might be useful to give ipecacuanha as an emetic early in the attack.

Assistant-Surgeon Chapple, of the Royal Artillery, says that he has saved a few cases which had advanced to the stage of coma; and he attributes his success chiefly to the employment of stimulant enemata. He remarks that there is a failure of nervous energy from the commencement, and that therefore our chief endeavors ought to be directed towards supplying this defect. The patients, in fact, generally die quite worn out.

Amongst the means of *preventing* sunstroke and other serious effects of excessive heat, the most important are the following: The body is to be bathed every morning in cold water, so as to insure a free and clean skin. All intoxicating fluids are to be avoided. Water, tea, lemonade, and other simple diluents, are to be freely partaken of. The meals should be at regular hours, with good properly cooked food. Natural perspiration is not to be checked. Light and loose flannel clothes are better than most other kinds. The head should be covered, when exposed to the sun, with thin folds of white linen or serge; this covering may be kept wet with cold water, if the heat be very great. A light-colored umbrella affords great protection. Directly there is experienced any sense of pain or tightness about the forehead, or dizziness, or weakness, the sufferer ought to retire into the shade, lie down, and have cold water poured gently over the head. Until medical assistance can be obtained, he may also take plenty of iced water, or cold tea.

With regard to the management of soldiers travelling in tropical climates Dr. Aitken gives some excellent directions, which I have ventured to abbreviate thus: When a march is to be undertaken in India during hot weather, the weak and sickly had better be left behind. The costume should be suitable for the early morning hours before sunrise, as well as for the scorching heat which follows. A flannel shirt is a safeguard against sudden chills: a flannel belt is an advantage, except in the hottest weather.

The shirt collar ought to be open. A light knapsack should be allowed, which does not require the use of crossbelts over the chest. The troops should march "easy" and loosely clad; at a pace not exceeding three and a half miles an hour: with halts when the men are exhausted; and with a longer halt half way, so that each man may have a biscuit and cup of coffee. The men ought to arrive on the *new* ground about an hour after sunrise. The camp should be formed on as high and open ground as possible. The men ought to be provided with an ample supply of water. And lastly, all rations of spirits should be discontinued.

VI. APHASIA.

Aphasia [from Ἀ = priv. + φάσις = speech] is a term first adopted by Trousseau to denote that form of speechlessness which is of cerebral origin. There may be a loss only of the faculty of articulate language; or, as is much more frequently the case, there is likewise an inability to express the thoughts by writing or by gestures. In other words there is a failure, in a greater or lesser degree, of the memory of words, and of the memory of those acts by means of which words are articulated; there being at the same time a diminution of intelligence. Dr. Hughlings Jackson puts the matter very clearly when he says, that talking implies three distinct things,—voice, articulation, speech. The first, produced by the larynx, is for sound; the second, formed by the lips and tongue and palate, is for utterance of words; the third, having its source in the brain, is for expression of ideas. It is this third condition which is affected in aphasia,—the loss of language is the result of the mental defect.

Aphasia is sometimes transitory; lasting only for a few minutes, or for hours, or for a week or two. During convalescence from severe attacks of fever there may be this variety of aphasia, perhaps due to passive congestion of some portion of the brain. But cerebral speechlessness is also often permanent; being the consequence of apoplexy, or of cerebral softening from embolism, or of the pressure of some syphilitic deposit or any other kind of tumor. So again, aphasia may either be complete, so that no syllable can be uttered; or it will be partial, one or two words being articulated more or less distinctly, though they are used in a wrong sense and to express every variety of want. And then also, this form of speechlessness is found to occur alone, or to be accompanied by hemiplegia; while if the latter be present, the paralysis is almost invariably found to affect the right side of the body.

Examples of "loss of speech," or of a "loss of the memory of words," have been met with by most practitioners, and have been noticed as "curious cases" almost since medicine possessed a literature. They have been carefully distinguished from instances of deprivation of voice (aphonia) the consequence of disease about the larynx, or of some affection of the organs of articulation; as well as from the silence of the deaf-mute, and of the lunatic who can speak but perhaps will not utter a syllable for several months. But it is only within a comparatively recent date that any attempt, founded on clinical observation with dissection after death, has been made to connect aphasia with a lesion of a particular and limited portion of the brain. The question is now being investigated on all sides; the animated discussions on this subject at the French Academy of Medicine,

in 1865, having more particularly excited the attention of numerous scientific men.

Many years have elapsed since Gall conjectured that the faculty of language was seated in those parts of the anterior cerebral lobes which lie upon the supra-orbital plates, without any restriction as to side; while he professed that pre-eminence as an orator was indicated by prominence of the eyeballs.* The localization of the faculty of speech in the anterior lobes of the brain, was regarded with great favor by Bouillaud as early as 1825; who believed, from cases observed by himself, that whenever the faculty of speech had been abolished during life, disease of these lobes was always to be found after death. This opinion he repeatedly advocated; and he seems to have maintained it as lately as 1865. During the year 1836, however, a more definite step was made by Dr. Marc Dax; who taught that disturbances in the faculty of speech were invariably connected with lesions of the left hemisphere—never with those of the right. He had observed that aphasic patients when paralyzed had hemiplegia of the right side, so that the lesion was of course situated in the left hemisphere. Then, some five and twenty years later (in 1861), M. Broca announced his conviction that the seat of the faculty of articulate language is in the posterior part of the third frontal convolution of the left lobe of the brain. This is therefore called "the convolution of articulate language." The term *aphemia*, proposed by M. Broca for this affection, has generally been rejected in favor of *aphasia*. During 1863, Dr. G. Dax attempted to prove that the lesion in aphasia is not only invariably seated in the left hemisphere, as his father had insisted, but that it is to be found in the anterior and outer portion of the middle lobe of that hemisphere,—that portion which borders on the fissure of Sylvius. Again, according to views published in 1864, Dr. Hughlings Jackson concludes that the most frequent cause of hemiplegia with loss of speech is obstruction of the middle cerebral artery or of some of its branches. Now and then it is due to syphilis, sometimes to injury. But any disease, whether softening from embolism, apoplexy, tumors, &c., will affect speech if situated in a certain region of the hemisphere; which region, whatever its precise limits may be, is at all events near to the (left?) corpus striatum. Dr. Jackson does not accept the old view that the brain is a double organ, nor the new one that the faculty of language resides only in the left hemisphere. All that he wishes emphatically to teach at present is, that when hemiplegia attends loss of speech the palsy is almost invariably on the right side of the body. And now lastly, in 1869, Dr. Bastian has suggested, that as speaking and writing are processes which so far differ that one power may be lost while the other remains intact, so it will facilitate the future consideration of this subject to classify the various cases of loss of power of expression under three heads. The divisions he proposes, and which it seems to me might well be adopted, are these: (1.) *Aphasia*, including persons who can *think*, but cannot *speak* or *write*. This class will contain the largest number of cases. There is mental impairment, from a degree well-nigh inappreciable to almost complete abolition of mind. There is usually hemiplegia. (2.) *Aphemia*, including those who can *think* and *write*, but cannot *speak*. The intellect may be unaltered; there is no hemiplegia. (3.) *Agraphia*, including persons who can *think* and *speak*, but can-

* The earliest notice of Gall's intention to publish his elaborate work on the Exercise of the Brain, and the possibility of recognizing the Faculties and Propensities from the Form of the Head and Skull, appears in the London Medical and Physical Journal, vol. iv, p. 50. London, 1800. The desire was that the volume should be put out in England and Germany at the same time. It was subsequent to this publication that Spurzheim, having been the pupil of Gall, became his associate.

not *write*. Such individuals on being told to write (their names, for example), produce a meaningless assemblage of letters. There are usually also, defects in the power of speaking, such as using wrong words.

A fair consideration of the views which have been put forward as to the seat of the faculty of articulate language serves to show, that hesitation and doubt are the fittest attitudes to assume at this crisis. So much evidence confirmatory of M. Broca's views has been put on record, that to pretend to be perfectly free from any bias is surely unnecessary. But it is one thing to wish a particular view to be true, and another matter to believe that it is so. The two points which may be held to at this juncture are, that in the greater proportion of recorded examples of decided aphasia there has been left-sided cerebral lesion; while in a large number of these again, the lesion has involved the third frontal convolution. Then, on the other hand, a few cases have been observed by Trousseau and others which presented appearances incompatible with those that should have obtained had we successfully localized the faculty of speech. The argument, also, of this physician and of Vulpian, that an organ so symmetrical as the brain cannot have one function assigned to one half and another power to the other half, is clearly not unreasonable if the premise be sound. But the question is, does this symmetry exist? Todd and Bowman, in their work on Physiological Anatomy, state distinctly that the convolutions of the right and left hemispheres do not present a perfect symmetry; while they notice as not a little remarkable, that in general, the lower the development of the brain the more exact will be the symmetry of its convolutions. Thus, the imperfectly developed brain of the child exhibits this symmetry, as does that of the inferior races of mankind. Whether the researches of Gratiolet will decide, as he believes, that the convolutions of the anterior lobe of the left hemisphere are developed at an earlier date than those of the right side, I do not know. At present this opinion is not to be received as a fact.

Although, however, objections derived from mere anatomical considerations seem undeserving of much attention, still it must be granted that decisive evidence cannot at present be brought forward from the domain of pathology. Even M. Broca, when advocating his views before the members of the British Association for the Advancement of Science, in 1868, did not shed new light on the subject. He again fully explained his theory of the localization of articulate language in the third frontal convolution of the left side, and argued for the corpus striatum as merely the medium of connection. Amongst other cases, he cited one in which a pistol-ball lodged in this third convolution without further damage, and in this instance articulate speech alone was lost, no other faculty being affected. At the same time, he admitted there were apparent exceptions to his rule, and he especially drew attention to cases of aphasia (or, as he still prefers to say, "aphemia") from disease of the island of Reil, with integrity of the convolution of articulate language. In these instances, however, this convolution is cut off from the corpus striatum; being thus practically destroyed, by its isolation, so far as utterance of words goes.

With regard to the general symptoms, it may be noticed that usually the deprivation of speech occurs suddenly. Perhaps, in a short time, two or three words can be uttered, which are then used in reply to all kinds of questions. The face is intelligent. The movements of the lips and tongue and palate and larynx are healthy. As so often mentioned, if there be hemiplegia it will almost constantly be found that the right is the side paralyzed. There may be consciousness of what is wished to be expressed, and yet complete inability to express the thoughts by speech, gestures, or

ven (frequently) by writing. Aphasic patients know the use of objects such as spoons, nightcaps, pipes, &c.), though they cannot name them.* Moreover, they can often play correctly at cards, backgammon, dominoes, &c., but too much importance must not be attached to this fact as an indication of intelligence, since many confirmed lunatics are able to do the same. The aphasics can perhaps read, but if they understand what they peruse they forget it directly, as they will pore over the same page again and again.

In cases of aphasia without hemiplegia recovery may occur spontaneously. Probably every kind of treatment (by drugs, bleeding, or blistering) is injurious. In aphasia with hemiplegia medicine is powerless to effect a cure, save in cases dependent on syphilis, when iodide of potassium or some preparation of mercury will be the remedy. Possibly, cod-liver oil, with the hypophosphite of soda and bark (F. 419), might do some good where there is softening of the brain of very limited extent.

VII. ALCOHOLISM.

Alcohol is an agent which, through the medium of the blood, seems especially to affect the nervous system, and more particularly the brain. When taken in a large dose it may immediately destroy life, like any other active poison. In smaller quantities, frequently repeated, its effects are very prejudicial, for it has a tendency to accumulate in certain structures (the nervous centres and the liver), in spite either of its destruction within the economy, or of its elimination by all the excretory organs—especially the lungs. The consequences of alcoholism must be considered under the two divisions of delirium tremens and dipsomania.

1. **DELIRIUM TREMENS.**—Delirium tremens (*Delirium è potu*, or *Delirium ebriositatis*) is still, unfortunately, a common disease in this country. It may be described as an acute attack of poisoning by alcoholic drinks. The delirium is characterized by hallucinations, fear, trembling of the muscles of the extremities, weakness, and watchfulness. The natural tendency of this disorder is to terminate in a critical sleep, at the end of

* The case related by Trousseau, of a Russian gentleman, resident in Paris, furnishes a good example of aphasia. Mr. T. spoke French like a Parisian, yet after his attack was unable to speak a word of French. When questioned he smiled and said "*da*," a Russian word meaning *yes*. He was unable to construct even part of a sentence in his own language When shown a spoon he could make gestures showing its use: and yet had forgotten its name in Russian and French. Nevertheless, he could play at whist correctly, and noticed any errors of his adversaries by making a gesture.—In another example a young man, twenty-five years old, was attacked with hemiplegia of the right side and aphasia. Some power of moving the right leg, and then of the arm, returned; but he could only articulate two words,—*No* and *Mamma*. "What's your name?"—"Mamma." "What's your age?"—"Mamma no." Yet he knew that his reply was incorrect. He had taught himself to write with his left hand as far as signing his name. He wrote this legibly. But on being told to say "Guénier" as he had written it, he made an effort and said "Mamma." "Say Henri," and he replied "No, mamma." On being told to write "mamma," he wrote "Guénier." "Write no," and he again wrote "Guénier." A third instance was that of the mother-in-law of a medical man. Whenever a visitor entered her room she rose from her chair with an amiable look, and pointing to a seat exclaimed,—"Pig, animal, stupid fool." She did not in the least understand the meaning of these insulting expressions. Her son-in-law had to explain her wishes.

from forty-eight to seventy-two hours from the commencement of the delirium.

The number of deaths which occur annually, in England and Wales, from excessive drinking, can only be very imperfectly ascertained. According to the returns of the Registrar-General, it seems that during the ten years, 1857–66, the deaths reported from delirium tremens amounted to 4958, while there were also 3447 from intemperance. In 1866, the mortality from delirium tremens was $\frac{\text{Males } 430}{\text{Females } 57} = 487$; that from intemperance being $\frac{\text{Males } 308}{\text{Females } 138} = 446$. Of course, these figures teach us nothing of the much larger indirectly fatal consequences of alcoholism.

Symptoms.—These are chiefly sleeplessness, a busy but not a violent delirium, constant talking or muttering, tremors in confirmed dram-drinkers, hallucinations of sight and hearing, a dread or suspicion of every one, mental with bodily prostration, and a generally excited and eager manner. The skin is commonly moist or clammy from copious perspiration, the face is sometimes pale but often flushed and wild-looking, the tongue is moist and covered with a white fur, and the pulse is frequent and soft. In severe cases there is an increase in the sulphates and in the urea, with a diminution in the quantity of phosphates contained in the urine; while in phrenitis, on the contrary, the phosphates are in excess. There is a complete loss of appetite, attacks of sickness are common, the bowels are confined, and pain may be complained of in the epigastric or right hypochondriac regions. The symptoms generally become aggravated towards night, while early in the morning there appears to be greater weakness.

The delirium is always peculiar. Often the patient will not allow that there is anything the matter with him; but he answers questions rationally, puts out his tongue in a tremulous manner, and does whatever he is bid at the moment. Then he begins to wander again, gives orders about his business to absent servants, refers to some imaginary appointment he must keep, or speaks of all he has been doing through the night. A publican will have been drawing beer for hosts of customers; a lawyer has been making an effective appeal to a jury. A medical man who was under my care three or four times was engaged during each attack in delivering "no end of women." The patient is also distressed or perplexed, and suspicious of all around him. Rats, mice, beetles, or other animals are about or under his clothes; strangers are in his room, or they will insist upon getting into his bed; listeners are at the door or behind the curtain. With all this there is incessant restlessness; his hands are in tremulous motion, while his features are constantly twitching, and he talks rapidly and continuously. He is perpetually wanting to get out of bed, though easily persuaded to lie down again; but if not watched, will soon be down stairs, and perhaps out in the street. There is but little fear of his harming himself or others, yet it is a wise precaution to remove his razors, fasten the windows, and so forth.

In favorable examples the critical sleep comes on about the beginning of the third or fourth day, when the patient falls into a sound slumber, which lasts for twelve or more hours. From this he awakes very feeble, but cured of his disease. On the other hand, in the examples of cases about to end fatally the watchfulness continues; the temperature of the body rises, perhaps, as high as 107° or 108°; there is muttering delirium, subsultus tendinum, and exhaustion, followed by great prostration, coma, or convulsions. Death most commonly takes place between the third and seventh days. Occasionally this result occurs rather suddenly, the patient being active in his delirium until the moment of his ceasing to breathe.

Causes.—Men are much more subject to this disorder than women. It arises from the excessive use of ardent spirits, wine, beer, or some fermented

liquor. The habitual use of opium, excessive mental excitement, and venereal excesses, will occasionally produce an affection resembling, but not identical with it. Individuals with an irritable nervous system, who are subjected to any prolonged mental strain, may induce this disease by smaller quantities of alcoholic drinks than would be required to excite it under other circumstances. But in all instances it is almost certain that the poison, in some form or other, has been taken; for there seems to me every reason to believe that delirium tremens is a specific toxæmia due to alcoholic excess.

According to some authors, the symptoms of delirium tremens may set in either after a protracted debauch of six or eight days, or upon the sudden withdrawal of the accustomed potations. The latter observation has been repeated so frequently that at last it has become a sort of recognized law; and yet for all that it is, in my opinion, a mistake. Evidence derived from hospital practice, from houses of correction and convict-prisons, and from asylums for inebriates in the United States, seems directly to negative it, and it may now be said to be at least highly probable, that a person accustomed to the very free use of stimulants can at once give them up without any danger whatever. In fact, as with other poisons, the only risk to be feared is from continuing their employment.

Treatment.—The great point, it has always been thought, is to check the incessant restlessness—to procure sleep. For this purpose opium has been given in full doses; either morphia, or solid opium, or Battley's liquor opii sedativus, or the common tincture. At the same time stimulants have been deemed necessary; and, as a rule, that stimulant has been considered the best to which the patient has been accustomed. Thus, supposing he has generally besotted himself with beer, good ale or porter has been freely administered; while if brandy or gin has been the favorite liquor, he has been supplied according to his depraved taste.

Now it is not pretended that this plan of adding fuel to the fire is always prejudicial; but it seems certain that when indiscriminately practiced, as it has been, great mischief must often result. The cases to which it is applicable are, indeed, the exceptional ones; while in the majority of instances, it is as absurd as it is injurious to treat a case of alcoholic toxæmia by continued doses of the very poison that has caused all the mischief. The practice to adopt is to bring about the critical sleep as soon as possible by removing the cause of the disease; to give ice and perhaps salines, to cool the irritable if not inflamed stomach, and to support the strength by milk, raw eggs, beef tea, &c. The wet-sheet packing (F. 136) has frequently a most soothing influence. Sometimes a cold shower-bath affords so much relief that the patient will ask to have it repeated. Where the depression is very great, stimulants must undoubtedly be administered, as in other cases of prostration, and in such, a well-timed dose of opium, with ipecacuanha and a little belladonna, will often prove useful. In three or four instances, where the delirium and constant talking seemed to be rapidly exhausting the patient, I have resorted to the use of chloroform with manifest advantage; but I have also seen this anæsthetic act prejudicially, the excitement returning in an aggravated form so soon as the influence of the vapor has subsided.

The late Mr. Jones, of Jersey, stated that for twelve years he treated all his cases of delirium tremens by large doses of digitalis, with a remarkable degree of success. He was accustomed to give half an ounce of the tincture (Phar. Lond., 1851) with a little water for a dose. In some few instances one dose was sufficient, but generally a second seemed to be required four hours after the first. Very seldom a third dose of two drachms was called

for, owing to the absence of sleep. The effect was to produce a warm skin, a fuller and more regular pulse, and six or eight hours' good sleep.* My own experience with this drug is not very large, but as far as it has gone it confirms Mr. Jones's statements. At the same time, I should never think of administering digitalis to all cases without distinction—a practice as injudicious as that of giving large quantities of brandy and opium simply because the individual is delirious. Foxglove has appeared to me to answer best when the symptoms have assumed a resemblance to those of acute mania, and where there has been decidedly increasing exhaustion.

Occasionally it is thought necessary to restrain the patient's movements by strapping him down to his bed, or by fastening a folded sheet across the chest and abdomen, or by putting on a strait-waistcoat. This should never be done, however, if it can possibly be avoided, as it always increases the excitement and prevents sleep. It will invariably be much better to have a good attendant at the bedside to calmly control him. The apartment occupied by the patient should be darkened, kept quiet and well ventilated, while nothing is to be done in any way calculated to produce that violent irascibility which is so easily provoked in these cases by a want of tact on the part of the friends.

2. DIPSOMANIA.—Within the last few years the word Dipsomania [from *Δίψα* = thirst + *μανία* = madness] has been revived, to express that craving for intoxicating liquors which, according to some physicians, partakes of the character of insanity. Now although a fit of intoxication is undoubtedly an attack of temporary mania, yet it appears a highly unphilosophical view (and one, too, which is fraught with the greatest danger to society) to regard a dipsomaniac as an irresponsible being; to look upon him, in fact, as an individual affected by some recognized form of lunacy. Hard drinking is a degrading vice, and, like many other vices, the more freely it is indulged in the more difficult becomes its discontinuance. It is a cause of insanity and a cause of crime, though I believe its influence in these respects has been much overrated.† The drunkard is artful and especially untruthful; he breaks every promise he makes, and he is perfectly regardless of the feelings and happiness of others. His good resolutions are few and written in sand; his temptations and failings appear innumerable and insurmountable. Nevertheless, it is absurd to say that the desire for alcoholic stimulants is a disease—that it is symptomatic of some abnormal cerebral condition, unless indeed we allow the same of every act of

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* The Medical Times and Gazette, p. 301. London, September 29th, 1860.

† Lord Shaftesbury says: "From my own experience as a Commissioner of Lunacy for the last twenty years, and as Chairman of the Commission during sixteen years, fortified by inquiries in America, I find that fully six-tenths of all the cases of insanity to be found in these realms, and in America, arise from no other cause than habits of intemperance." Quoted from Dr. Belcher's pamphlet on Reformatories for Drunkards, p. 9. Dublin, 1862. Also from How to Stop Drunkenness. By Charles Buxton, M. P. London, 1864. Reprinted from the North British Review, 1855.

This statement is just one of those which tell with great force at temperance meetings. But after all is it correct? I can only say that none of the Asylum reports with which I am acquainted afford any evidence in confirmation of it, and surely the physicians to these institutions ought to be able to arrive at the truth on this point as readily as Lord Shaftesbury. If we take Dr. Hood's Statistics of Insanity, we shall find "the apparent or assigned causes" given as regards 3668 cases (male and female), admitted into Bethlem Hospital from 1846 to 1860 inclusive. Out of this total the disease is said to have been produced by intemperance in 177; but according to Lord Shaftesbury the number ought to have been 2200. May not his "experience" be like that of so many other men—fallacious?

wickedness or folly. Not only is the experience of the dead-house against such a view, but if this evidence be set aside as of little value, we yet know that there is no difficulty in curing the most inveterate sot, provided we are but able to deprive him of his poison. The fact is indisputable that many who drink to excess can be persuaded to abstain temporarily, if only a limit to their abstinence be fixed, so that they may enjoy the anticipation of a debauch, while a few can be so influenced that they renounce this habit entirely.

The drunkard is a nuisance to himself and to all who are brought into contact with him; and it is to be regretted that there are no legal means of controlling him until he is cured of his folly. The man who attempts suicide by some summary process is liable to imprisonment; while he who slowly poisons himself can proceed to certain destruction with impunity. He may ruin himself and his family, but so that he breaks only moral laws and obligations he cannot be stopped in his downward career. The welfare of society demands some place of detention for such men; and even if an Act of Parliament could not be obtained to sanction the necessary interference with the liberty of these misguided people, yet I believe that there are many who would voluntarily enter and submit to the rules of an institution for the cure of drunkenness. Mr. Dickens in his "American Notes" mentions the case of a man who got himself locked up in the Philadelphia prison, so that he might rid himself of his propensity to drink; where he remained in solitary confinement, for two years, though he had the power of obtaining his liberty at any moment that he chose to ask for it. Patients have more than once told me that they would gladly submit to any treatment or surveillance; but they have also said that without restraint all else would be useless, for they could not trust themselves.*

Our knowledge of the precise effect of alcohol upon the living body is becoming more and more perfect, though many points still remain for elucidation. A series of experiments led MM. Ludger Lallemand, Maurice Perrin, and J. L. P. Duroy,† to teach that alcohol is not only separated from the blood by the tissues of the body—especially the substance of the brain and of the liver, but that the excretory organs freely help to eliminate it; the length of time required for its entire removal from the circulating current depending of course upon the quantity introduced into the

* Institutions for this purpose have been formed in the Isle of Skye. Dr Christison, in relating an account of a visit to one of these establishments, where whisky could only be obtained by a walk of twelve miles, remarks: "Here we found ten gentlemen—cases originally of the worst forms of ungovernable drink-craving—who lived in a state of sobriety, happiness, and real freedom. One, who is now well, had not yet recovered from a prostrate condition of both mind and body. The others wandered over the island, scene-hunting, angling, fowling, botanizing, and geologizing; and one of these accompanied my companion and myself on a long day's walk to Loch Corruisk and the Cuchullin Mountains. No untoward accident had ever happened among them. I may add, that it was impossible not to feel that, with one or two exceptions, we were among a set of men of originally a low order of intellect. Radical cures are rare among them; for such men, under the present order of things, are generally too far gone in the habit of intemperance before they can be persuaded to submit to treatment. Nevertheless, one of those I met there, a very bad case indeed, has since stood the world's temptations bravely for twelve months subsequently to his discharge." A Lecture delivered before the Royal College of Surgeons of Edinburgh, March 19th, 1858. Since the delivery of this lecture this establishment has been given up. But there are others in various parts of Scotland; and among them an excellent one, on a limited scale, at Ostaig in Skye, under the care of Dr. Macleod. There are also four "Inebriate Asylums" in the United States.

† Du Rôle de l'Alcool et des Anesthésiques dans l'Organisme: Recherches expérimentales. Paris, 1860.

system. The experimenters believed themselves justified in deducing the conclusion, that alcohol is neither transformed nor destroyed in the living body, but that the whole of what is ingested is excreted unchanged; so that this substance has no claim to be regarded as a producer of heat—as a true food, but must be placed in the same category with the medicinal or toxic agents whose presence in the living body exerts a most important influence on its functions, though they do not themselves enter into combination with any of its components. These opinions are directly contradictory to those which have been accepted from Liebig; who ranked alcohol among the heat-forming aliments, capable of replacing the fatty, starchy, and saccharine elements of food. Hence they have not been allowed to pass unchallenged; and M. Edmond Baudot, Dr. Hugo Schulinus, and Dr. Francis E. Anstie have, by their independent researches, shown the incorrectness of the total elimination theory.

Briefly stated, the opinions of these three gentlemen seem to be as follows: Thus, according to M. Baudot's* conclusions it is allowable to believe that alcohol is destroyed in the organism, and that it fills the office of respiratory food, as asserted by Liebig. To this M. Perrin† has replied, reiterating his assertion that alcohol is neither transformed nor destroyed in the organism; that it is eliminated by the various excretory organs; and that it offers none of the characters of food. Then the researches of Dr. Schulinus‡ have led him to make these deductions: (1.) The effects of alcohol on men and animals are uniform. (2.) The largest portion of any ingested dose of alcohol is always in the blood, and not in the nervous centres or liver. (3.) The greatest portion of any dose of alcohol which may be taken is always decomposed in the organism. And (4.) The proportion of alcohol which escapes unchanged in the breath, sweat, and urine, is trifling relatively to the amount which is utilized in the body. Finally, Dr. Anstie,§ whose views on stimulation in febrile diseases are so well known, has stated positively that it is impossible any longer to deny that alcohol is a food. The quantities in which it can be taken without causing visible toxic effects would alone establish this, unless we were at liberty to suppose that it was rapidly eliminated in bulk. Such elimination, however is now finally disproved.

The pernicious effects of the excessive use of alcoholic stimuli, as revealed after death, are found to be induration of portions of the nervous centres, congestion of the respiratory organs, amyloid and fatty degeneration of the liver, chronic inflammation and thickening of the walls of the stomach, with disease of the substance of the heart and kidneys. Cirrhosis, or gin-drinker's liver, with all its painful train of symptoms, is a common result. Dipsomania may also lead to tuberculosis, though it probably does so indirectly, by taking away all desire for food and so lowering the powers of life. But it must be remembered that these morbid changes are the consequences (not the cause) of the abuse of stimulants; for in no instance is it pretended that the condition of brain has been demonstrated, which according to some writers gives rise to the propensity to drink.

The evils which afflict the drunkard are so great that it is unnecessary to resort to fables to point any moral. For example, spontaneous combustion from the excessive use of alcoholic stimuli, is only a silly fiction; its gross absurdity, however, being a powerful recommendation to the lovers

* L'Union Médicale, pp. 272, 357, 374, 390. Paris, November 10th, 21st, 24th, 26th, 1863.

† Idem, p. 582. December 23d, 1863.

‡ Archiv der Heilkunde, pp 97–128. Leipzig, 1866.

§ The Lancet, p. 120. London, January 25th, 1868.

of the marvellous. It would not be difficult to collect fifty recorded examples of it; just as fifty sane people might easily be brought together to testify to the truth of spirit-rapping, table-turning, clairvoyance, and so forth. But the physician credits none of these idle tales. His character, like that of the true philosopher as described by Herschell, "is to hope all things not impossible, and to believe all things not unreasonable."

A few words must suffice on the medical treatment of *chronic alcoholism;* which differs from delirium tremens inasmuch as it is not an acute disturbance of the functions of the nervous system, but a protracted state of general depression with restlessness. The chief points that demand attention are these: To enforce total abstinence at once; since I believe it to be more easy for the habitual drinker to renounce all stimulants, than to practice moderation. Then, to guard against sleepless nights by the exhibition, when needful, of the extract of henbane or hop, or even of opium; to afford mental occupation and amusement, and especially outdoor recreation in cheerful society; to administer tonics and such remedies as will give nervous and gastric tone; and to regulate the diet. In almost hopeless cases an attempt may be made to substitute opium for alcohol. The opium-eater is at all events not an annoyance to others; he is much less likely to commit criminal acts than the drunkard; while he injures his health in a smaller degree than the sot. Of two evils we may well choose the least. Dr. Marcet states that the nervous symptoms present in these cases may be best relieved by the oxide of zinc; which is to be given in two-grain doses, twice a day, gradually increasing the quantity until twelve or sixteen grains are taken in the twenty-four hours (F. 415). The reputed effects of this powder are to induce sleep, to remove the tremor of the limbs, to relieve the headache and giddiness, and to destroy all hallucination. In my hands, however, it has not answered these expectations. More reliable remedies are, I believe, to be found in the hypophosphite of soda, or in ammonia and bark, the mineral acids and gentian, quinine and citrate of iron, pepsin and reduced iron, and phosphate of zinc with nux vomica. It is often a question as to what shall be substituted for beer or wine at mealtimes, and I generally recommend milk or some agreeable fruit-syrup in soda water.

In conclusion, I would venture to give a word or two of warning to practitioners as regards their manner of prescribing stimulants, and to urge the necessity for ordering these remedies with great care and discretion. In acute diseases more prudence is usually exercised than in chronic affections. It is in these latter, that so much mischief is apt to arise from recommending "a little brandy and water occasionally;" or from sanctioning "a glass or two of wine" for faintness or low spirits. Having seen again and again the mental misery and physical destruction produced by a craving for strong drink, when once the desire has been started, I feel it impossible to be silent on this head. It is also the more necessary to speak, seeing that a tendency exists on the part of the public to trace the origin of not a few cases of confirmed drunkenness to the careless advice of medical men. This is not the place, however, to inquire if the charge be just, or to assert that it has been overstrained: suffice it to remark our practice should be such, that even suspicion cannot attach to us. And consequently, when it is necessary to recommend the use of some alcoholic stimulant, not only is the kind to be specified, but also the exact quantity; while the times at which the doses are to be taken ought to be mentioned. I would even go further and say, that in many cases (and perhaps always in the instance of a reclaimed hard drinker) it will be better to order a medicine like the carbonate of ammonia or the spirit of ether, where a stimulant is required,

than to recommend brandy, or gin, or wine, &c. Without a doubt, the examples of chronic disease where beer and wine are needed except at meals are exceptional; while a number of persons who consume these fluids then, would in all probability be much better without them.

VIII. INSANITY.

1. GENERAL OBSERVATIONS.—Few subjects more deserve the careful study of the medical practitioner than the diseases which affect the intellectual functions, and few have been more neglected until a comparatively recent date. "The care of the human mind," says Gaubius, "belongs to the physician,—it is the most noble branch of our office."

Several *definitions* have been attempted of insanity; but though unsoundness of mind is for the most part easily recognized, it cannot be satisfactorily defined. As a rough description which is sufficiently definite to embrace all forms it may be said, insanity consists of a functional or organic disease of the gray matter of the cerebral hemispheres; this disease giving rise to illogical or erroneous ideas, to disordered actions, and to that general mental condition which hinders a man from discharging his duties to his God, his neighbor, and himself. This definition is open to many objections; and let doctors and lawyers vex themselves as they may, every endeavor to form one will be so. For, as nothing can be more slightly defined than the line of demarcation between sanity and insanity; so if we make the definition too narrow it becomes meaningless, and if too wide the whole human race may be involved in it.*

The *indications* of impending cerebral mischief may generally be detected by the careful physician some months before they attract the serious attention of the patient or his friends. The chief premonitory symptoms or prodromata have been especially pointed out by Dr. Forbes Winslow, who forcibly insists upon the fact that cerebral affections are not suddenly

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* The Report from the Select Committee on Lunatics, ordered by the House of Commons to be printed, July 27th, 1860, shows that the number of lunatics in England and Wales in 1844, 1858, and 1859, was as follows:

	January 1st, 1844.	1858.	1859.
In Private establishments, . . .	3,790	4,612	4,762
In Pauper Asylums, Workhouses, &c. .	16,821	30,735	21,230
Total, . . .	20,611	35,347	35,992

Thus, it seems, that the increase of lunatics is much in excess of the extension of the population between the above periods; but allowance must be made for improved registration, as well as for the diminished mortality among the insane. The figures, however, show that at least one person out of every 600 in England and Wales was incapable of managing himself and his affairs. Doubtless a vast proportion of these were cases of idiocy, or of mental imbecility from age, fits, &c. These are always incurable; but of the rest, some 50, 60, or perhaps 70 per cent., may be deemed to have been curable if they were taken in time and carefully treated.

The total number of Private and Pauper Lunatics and Idiots in England and Wales, as known to the Commissioners of Lunacy on January 1st, 1868, was $\frac{\text{Males } 15,734}{\text{Females } 17,479} = 33,213$. Of these only 3384 were deemed curable; 435 had been found lunatic by inquisition; and 675 were criminals. The foregoing total of 33,213 does not include 274 private patients under single care.

developed, while they are often rendered incurable by a neglect of treatment in the early stages. The threatenings of incipient insanity which should excite alarm, are—headache, attacks of giddiness and mental confusion, paroxysms of irritability and loss of temper, inaptitude for usual occupations, a weariness of life, a state of sleeplessness or of lethargy, loss of memory, some marked deviation from the usual line of conduct, defective articulation, dimness of sight, and flightiness of manner. The patient feels too that he is not quite right, yet he does not like to consult a physician. He also shuns his old friends; is tortured with nonsensical, blasphemous, or obscene thoughts; has restless nights, or disturbed sleep with frightful dreams; while generally he suffers from dyspepsia.

Mental diseases are not only dependent on temporary or permanent faulty nervous structure, but are likewise frequently accompanied with symptoms of a variety of bodily disorders. Even the Greek and Roman physicians were aware of this fact; yet in the present day it is often forgotten, and the physical disorder (other than the cerebral) is allowed to pass on unnoticed, simply because it is not at first apparent. Diseases of the lungs are frequent; especially the low forms of pneumonia, pulmonary gangrene, and tubercular consumption. In their early stages, these diseases are apt to escape notice. Thus many insane patients have died of pneumonia without manifesting any symptoms of pulmonary inflammation; so that the existence of this affection has not been suspected until its discovery in the post-mortem room. It is always a safe precaution to examine the chest, when a lunatic seems even slightly ill. Probably one-fourth of the deaths which occur in asylums are due to pulmonary consumption. Many observers have remarked upon the supposed predominance of heart affections in the insane; but if the statistical reports of a large number of asylums be examined, no evidence can be obtained to show that cardiac diseases are more rife among the inmates than in the sane. The occurrence of insanity with paralysis, and with epilepsy, will be noticed presently. Diseases of the stomach and intestines and liver are far from rare. The sexual organs, especially in women, may be the seat of morbid action or of growths. Lallemand has described the case of a patient who believed himself to be a woman, and who wrote letters to an imaginary lover. The necroscopy revealed enlargement and induration of the prostate gland, abscesses, obliteration of the ejaculatory ducts, and enlargement of the vas deferens with dilatation of the vesiculæ seminales.

2. VARIETIES OF INSANITY.—Much diversity of opinion exists as to the best classification of mental diseases. As an intelligible and serviceable one for clinical instruction, I shall adopt that proposed by Pinel and Esquirol, who arranged the various forms of insanity under the heads of *mania, monomania, dementia,* and *idiocy.* To these classes a fifth must be added,—the *paralysis of the insane.* With regard to the first four divisions it ought to be remembered that the differences between these varieties are almost always imperfectly marked; that the descriptions laid down in books are extraordinarily distinct compared with the medley of symptoms presented by real cases, and that the various forms frequently run into each other.

(1.) *Mania.*—Mania [*Μαίνομαι* = to rage], or raving madness, may be said to be characterized by *general* delirium. The reasoning faculty, if not completely lost, is disturbed and confused; the ideas are abundant, erroneous, absurd, wandering, not under control. The manners are violent, excited, and exceedingly mischievous.

Although mania rarely makes its incursion suddenly, still it is the

of insanity which most frequently does so. Repeatedly there are premonitory symptoms, such as neglect of family and business, change of moral character, distrust of relatives, fits of passion, despondency, insomnia, &c. When the disease sets in the delirium becomes general and the fury extreme. Then it is that maniacs often destroy themselves, either from not knowing what they do, or from despair,—being conscious of their condition, or from accidentally injuring themselves. The difficulty of describing the symptoms of mania is extreme. "Where is the man," says Esquirol, "who would dare to flatter himself that he had observed, and could describe all the symptoms of mania, even in a single case? The maniac is a Proteus, who, assuming all forms, escapes the observation of the most practiced and watchful eye." Mania may become complicated with epilepsy; it ofttimes ends in dementia and paralysis.

In general, maniacs soon become weak and emaciated. The mere physical exertion which they go through, very commonly talking, shouting, howling, laughing, reciting, &c., for hours together; often furious, destructive, and rapidly moving about;—the fatigue of all this would quickly exhaust a strong man. In addition there is a want of refreshing sleep night after night, and not unfrequently an aversion to all food. Ofttimes the patient has incontinence of urine, while this secretion perhaps contains an excess of phosphates. The temperature of the body is above that of health; it is especially raised during the evening. Where recovery takes place, it is invariably preceded by sleep and a desire for food. There is then a gradual cessation of the agitation and delirium.

Puerperal Mania is a peculiar affection occurring to women almost immediately, or about the fourth or fifth day, after delivery. A similar disease sometimes attacks pregnant women long before labor, or it sets in months afterwards, as a consequence of undue lactation. Puerperal mania commences usually with symptoms of agitation and excitement, though now and then there is only great moroseness and obstinacy, this last feature being often most evinced in a persistent refusal to take food. Under any circumstances, a great dislike is apt to be early shown towards the husband and infant. There is also considerable restlessness, insomnia, severe pain in the head, and a diminution of the secretion of milk. Sometimes there is no fever; on other occasions the skin is hot and dry, while the pulse is full and frequent, and the tongue thickly furred. Constipation is the rule, with a diminution of the secretion of urine. The lochia may cease abruptly. Formerly it was believed that inflammation of the brain and its membranes was the cause of this disease. No one holds such an opinion now, so far as I know. In the cases which I have seen there has been great debility, the patients having been prostrated either by floodings during their labors or by the presence of a morbid poison (as that of erysipelas) in the system, or by some other cause which has lowered their vital powers. The delirium is often violent; there may be a strong tendency to suicide or child-murder, and there is either great general irritability or an appearance of deep melancholy. The prognosis is generally favorable with respect to the ultimate restoration to mental health. The fact of one pregnancy being followed by mania should make us very watchful on subsequent occasions. Contrary to many authorities, I think the recurrence of the disease is much to be feared. As regards their treatment these cases of puerperal mania require particular care. The indications are to rouse and support the powers of the patient, and to allay the irritability of the brain and the nervous system. The first is to be accomplished by a cordial, stimulant, and nutritious diet. One of the brandy and egg mixtures (F. 17) will often be very useful in oft-repeated doses. Ammonia and bark (F. 371),

nine and phosphoric acid (F. 379), and cod-liver oil (F. 389), are all cacious remedies. Good beef tea and wine also prove beneficial. The ebral excitement is to be calmed, and sleep procured, by sedatives, ecially by full doses of the extract of stramonium (F. 323), or of the ract of opium (F. 343), or of camphor with henbane (F. 325), or of rphia and Indian hemp (F. 317). The subcutaneous injection of rphia (F. 314) often procures sleep when other remedies fail. The con- ation is to be overcome by small doses of castor oil, given in hot and t beef tea, or by mild aperient pills, or the confection of senna. The ient must be controlled effectually, but mildly, by a humane nurse stomed to the management of these cases. Moreover, she had better ver be left alone, lest a sudden impulse to commit some act of violence ercome her. It is almost always desirable to remove the infant from the k-room, for suckling by the mother is not to be thought of. When the ease threatens to be of considerable duration the sufferer should cer- inly be separated from her family and friends.

(2.) *Monomania.*—Monomania [*Μόνος* = alone + *μαίνομαι* = to be furi- s,—irrationality on one subject only], or partial insanity, is that form in hich the understanding is deranged to a certain degree, or is under the fluence of some one particular delusion. The mind is vigorous; the ideas e few, erroneous, fixed, not under control. The manners are in accord- nce with the predominant idea or train of ideas. At one time the intel- ctual disorder is confined to a single object, or to a limited number of bjects. The patients seize upon a false principle, which they pursue gically, and from which they deduce legitimate consequences that modify heir acts and affections. Thus, a monomaniac will insist that his body is ade of glass, and being thoroughly impressed with this idea, will reason orrectly that slight causes may injure it; he consequently walks with care, nd avoids any rough handling. Aside from this partial delirium, he often hinks, reasons, and acts like other men. Another, in the belief that he is bad half-crown, will go round to the neighbors warning them not to take im in payment or to give change for him when his wife offers him at the ounter. Again, a third will fancy himself suspected of some horrid crime, e may think he is possessed of a demon or evil spirit, or will believe him- elf to be a god—imagining that he is in communication with heaven. Occasionally, under the idea that he is a divine instrument of vengeance, he monomaniac commits murder. He will often be happy, full of joy, and ommunicative, unless rough attempts are made to control him, when he be- omes wild and furious. Such individuals ask the most extraordinary avors, and make the most absurd demands. The following copy of a letter, resented by a monomaniac to Dr. Conolly, is a good example: "In the ame of the Most High, Eternal, Almighty God of Heaven, Earth, and Space, I command you to procure me the following articles immediately: A Holy Bible, with engravings, &c.; a Concordance; a Martyrology, with plates; some other religious books; a late Geographical Grammar, a modern Gazetteer, newspapers, magazines, almanacs, &c., of any kind or date; musical instruments and music; large plans, guides, maps, directories," and many other works, concluding with "wines, fruit, lozenges, tobacco, snuff, oysters, money—everything fitting to Almighty God. Answer this in three days, or you go to hell. P. S.—A portable desk and stationery, and a dressing-case."

A remarkable and not uncommon effect produced in the mind by insanity is the hypochondriacal supposition of the existence of venereal disease (see the section on Syphiliphobia, p. 284). In one instance related by Sir W. Ellis, although there was no possibility of the disease having existed, the

patient fancied she had been infected; while she could not rest satisfied until put under a course of what were believed to be mercurial medicines. After having taken pills made of bread-crumbs, for several days, the patient, from the expectation that they were to produce salivation, spat such a quantity of saliva as to require a vessel constantly by her side for that purpose. When this had persisted for some time, she imagined that the medicine had produced its effect; the bread pills were discontinued, and the excessive action of the salivary glands ceased.

Almost every insane patient labors under hallucinations of one or more of the senses,—he sees or converses with imaginary beings. When he is satisfied by the evidence of his other senses that what he sees or hears is only an *illusion*, he is said to labor under an *hallucination*; whereas, when he believes in his false perceptions the hallucination becomes a *delusion*. Some authors use the terms hallucination and illusion in a somewhat different sense. Thus if a man hears voices speaking to him which no one else can hear, or sees objects no one else can discover, they say he labors under an hallucination; but to lay the foundation for an illusion there must be present some material object,—thus the clouds are formed into angels sounding trumpets, the windmill is regarded as a giant, and so on. Hallucinations may exist where the senses of sight and hearing are absent, but illusions of course cannot do so. Illusions are frequently observed in a state of mental health, being then corrected by the reason.

The actions of lunatics are at times most contradictory and undecided. Frequently, the sufferer is puzzled; being tormented by the commands of different spirits. For example, a gentleman, after recovery, recollected that various spirits would assail him at breakfast. One said, eat a piece of bread for my sake, &c.; another at the same time would urge, refuse it for my sake, or refuse this piece for my sake and take that; others would direct the tea to be taken or declined. He saw that he could not comply with one without disobeying the other, so that there was hesitation at every morsel put in the mouth. Again, it is occasionally sufficient for the good or bad or indifferent spirits to order a thing to be done for the lunatic to refuse to do it. Mr. Perceval, who has detailed in full the treatment he was subjected to in different asylums,* states: "I disobeyed the voices in doing so, but it was usually a reason for me now to do anything, if I heard a spirit forbid it." The love of contradiction, however, is not always shown thus. The same author says in his narrative, that it was always a great delight to get his hand loosened from the strait-waistcoat,—"and the first use I usually made of it was to strike the keeper who untied me, directed by my spirits to do so, as the return he desired above all things else, because he knew I was proving my gratitude to the Lord Jehovah at the risk of being struck myself." And again, when being shaved he used frequently to ask the barber to cut his throat,—"in obedience to voices I heard; but I did not want it."

Sometimes the symptoms are so far obscure that although the conduct of the patient, the expression of his countenance and his demeanor, suggest mental delusions, yet he manifests nothing of the sort in his conversation. The insanity may then frequently be detected by the written letters. Such a case occurred in my own practice. I was sent for one morning to see a

* A Narrative of the Treatment Experienced by a Gentleman during a state of Mental Derangement; designed to explain the causes and the nature of Insanity, and to expose the injudicious conduct pursued towards many unfortunate sufferers under that calamity. London, 1838. In a second work with the same title, published in 1840, the writer gives his name—"John Perceval, Esq.," and acknowledges the authorship of the first volume.

young gentleman whose manners were peculiar, but who spoke rationally. A few hours afterwards he wrote to me: "I find that after a physician has received his fee he must do whatsoever the patient wishes, unless he (the physician) can and does certificate that to be peculiarly hurtful and detrimental. I require you to come prepared to lave my bowels completely, and apply the anti-costive oil; prepare the perineum for a blister, and put three ounces of castor oil in the bladder. I have got a preparation made to keep the blister open."—In another example a well-conducted youth, who had only evinced a few vague symptoms of depressed mental and bodily health, left his home in town to spend a few days at the seaside. His respectable but poor and hardworking relatives were startled at the end of a week by getting a short note asking for twenty pounds, as he had purchased a horse. Unable to gratify this request, the next day they received the following letter, written in an almost undecipherable hand on several smudged and blotted sheets of paper: "I think your conduct is disgraceful. I have not only bought a horse but a basket-chaise. You have put me to great inconvenience. I think it will be a long time before we are again friends. You are damned fools; do you think when a fellow buys a horse he is obliged to keep him. A horse a horse my kingdom for a horse. At length I have got one and moreover a beauty a highflyer. I took him out this morning —I put him in a gallop away the beggar went still I stuck like wax—The cabmen of course chaff'd me hold on I needed not their advice. I thought I was riding a race. Fortunately I pulled up and a gentleman helped me off. He said he never in his life saw a horse so seated and I was worthy of being Cavalry officer in the Artillery. I think without exception you are all the most disagreeable family exhisting. I shall not remain at —— thats certain. The horse is mine, a carriage bought by my own money. You have inconvenienced me exceeding in not sending me a £5. All this disarrangement of the family—arises entirely from your unsisterly and disgraceful conduct towards me I despise *you*, Your Brother." Again, Dr. Noble mentions the instance of a youth, twenty-one years old, the son of a publican, who had become reserved, disdainful, and totally changed in disposition shortly before being seen. No perversion of ideas was apparent, excepting from his demeanor. Attempts to gain an explanation were quite vain; still, the intuitive good sense of those about him suggested that he was not in his right mind. An accident at length revealed the fact. The draft of a letter to the Queen Dowager was found, showing that he believed himself to be her son, and was indignant at being temporarily deprived of his birthright.*

That form of monomania which is characterized by fear, moroseness, and prolonged sadness, has been separately described by some authors as *lypemania* [Λύπη = sadness + μανία] or *melancholia* [Μέλας = black + χολή = bile]. Such cases are most painful to have charge of, the despondency is often so great. Everything that is done to relieve them becomes a new source of suffering: they are incapable of experiencing pleasure from any acts of kindness or attention; no pursuit has the slightest charm for them. A lypemaniac is unwilling to move, or talk, or to take food; he is morose, capricious, contradictory, quarrelsome, and discontented; while he will often remain a whole day without change of posture, or without uttering a word. He now and then wishes to be alone, and yet dreads solitude; sleeps but little; sometimes tortures himself by the anticipation of neverending punishment hereafter; while at other times he is bent on severely maiming or destroying himself, or on murdering others.

* Elements of Psychological Medicine, p. 125. Second Edition. London, 1855.

The attempt to commit suicide [*autophomania*, *Αὐτοφόνος* = a self-murderer] is not, as a general rule, made from any sudden impulse, but rather from a long-premeditated determination, and often when patients find that they are so watched that it is impossible for them to carry out their design, they will assume a cheerful manner for days or weeks, so as to lull suspicion, and then avail themselves of the first opportunity which offers. Hanging seems to be a favorite mode of self-destruction among the insane of this country. When a would-be suicide has determined (usually after much consideration) upon the manner in which he shall destroy himself, it may be practically useful to remember that he will very often wait and neglect all other means which may present themselves until he can accomplish his death after his own fashion. Sir W. C. Ellis mentions the case of an old gardener who one day consulted him as to the best mode of destroying himself, since he said that he had made up his mind not to live any longer. The heinousness of the crime contemplated, and the fact that hanging was a most painful death, were pointed out; his wife was directed never to leave him alone, and he got better by the use of medicines which restored the healthy character of the secretions. Some time afterwards, however, he was discovered dead in a little shed in his garden, where he used to keep his tools. It appeared that so determined had he been to die by hanging, that though the place was so low he could not stand upright in it, and he had not a rope or even a string with which he could suspend himself, yet he contrived to carry out his wishes by getting a willow twig and making it into a noose, which he fastened to one of the rafters. He must have stooped to put his head through it, and then, pushing his feet from under him, suspended himself until he died. Had he not made up his mind to destroy life in this particular manner, he might have done so much more easily by drowning himself in the pond which was in his garden, or by cutting his throat with the knife which he always had about him. In many instances, melancholics having a tendency to suicide will resort to modes of destruction such as baffle all ordinary precautions. For example, they will set fire to their clothing, and while parts of the body are burning appear neither to suffer pain nor fear, but rather to triumph in their martyrdom. A lady, the subject of religious mania, as her clothes were burning on her, said: "Let me die; the pain of my body is nothing compared to the pain of my mind." And even during the few hours that she lived after setting herself on fire, with the right side of her body all charred, she showed signs of suicidal tendency as great as ever. So a man who recovered after cutting away the whole of his genital organs, still evinced so strong a desire to operate further upon himself, that he had to be most carefully watched. Such is their singular tenacity of purpose, that suicidal patients will tear their night-dresses, and by stuffing the shreds into their mouths endeavor to produce suffocation. Again, cunning lunatics, while taking pills containing narcotics, have been known to hoard successive doses, until they have accumulated a poisonous quantity.

Another variety of monomania has also been described as *moral insanity*; in which there is perversion of the natural feelings, affections, temper, habits, and moral dispositions, without at first any remarkable disorder of the intellect. Eccentricity of conduct, an impulse to commit crime, a propensity to every species of mischief, are often the leading features. These cases sometimes assume an uncontrollable destructive tendency [*androphomania*, *Ἀνήρ* = a man + *φονεύω* = to kill], and the lunatic commits murder; or there may be a propensity to set houses or other property on fire [*pyromania*, *Πῦρ* = fire]; or the disease will possibly give rise to an irresistible desire to steal [*kleptomania*, *Κλέπτω* = to steal], things being often pilfered

for which the madman has no use, or which he could easily purchase if needed.

In *erotomania* [*Ἔρως* = love + *μανία*], according to Esquirol, amatory delusions rule, just as religious delusions predominate in *theomania* [*θεὸς* = God] or religious melancholy. Erotomania may be only an excessive degree of a chaste and honorable affection; or it will be combined with *nymphomania* [*Νύμφη* = the nympha] in woman, or with *satyriasis* [*Σάτυρος* = a satyr] in men. In all these forms there is usually great mental and bodily depression; women suffer the most frequently, especially those who are single; and the phenomena are often connected with some malformation or organic disease of the sexual organs.

The occurrence of *insanity with epilepsy* is said by Esquirol to be incurable, and the experience of most physicians will confirm this remark. The conduct of insane epileptics, is often characterized by the most ferocious, murderous, or suicidal aberrations; it is frequently also most filthy and disgusting. Notwithstanding these unfavorable symptoms, however, residence in a well-ordered asylum can do much to induce a certain amount of mental tranquillity; whilst a good diet and daily exercise will contribute to the physical improvement. By some practitioners bromide of potassium is said to reduce the frequency of the fits, as well as to soothe nervous irritability. If early death do not result, the disease usually subsides into incurable dementia.

Dr. Bucknill states that in epileptic cases where no considerable amount of dementia has resulted, the brain is not found atrophied or presenting any appearances of disease. Not unfrequently, indeed, the weight of this organ is much increased. The heaviest brain weighed by Dr. Thurnam was that of an uneducated butcher who could only just read, and who died of epilepsy combined with mania, after about a year's illness. This man's brain weighed 62 oz. avoir.* Dr. Thurnam remarks that epilepsy is often connected with an unusually large brain. In the case of a male epileptic, 37 years of age, seen by Dr. Bucknill, this structure weighed 64.5 oz. In the examination of thirty-three brains of epileptics, this gentleman only once found a spicula of bone projecting from the cranium, and once only a tumor.

The connection of homicidal and suicidal impulses with epilepsy is very remarkable. An epileptic may commit the greatest violence directly after a fit, without any subsequent recollection of what he has done. Sometimes, instead of the epileptic seizure occurring in the usual form, it seems to burst into an attack of acute mania. In a few days, or perhaps hours, the symptoms pass away; the individual remaining sensible and well behaved until the recurrence of the epilepsy. Possibly, however, in the first fit he may destroy himself. The medico-legal bearings of such cases are highly important.

(3.) *Dementia.*—Dementia [*De* = priv. + *mens* = the mind] or incoherence, is that condition in which a general weakness of the intellect, induced by disease or age, is the prominent feature. The mind is altogether feeble; the ideas are confused, vague, and wandering; and the memory daily becomes more and more impaired. There are paroxysms of restlessness and excitement. The patients are ignorant of time, place, quantity, property, &c. They forget in a moment what they have just seen or heard. Their manners are undecided, childish, and silly: their conversation is incoherent, and they repeat words and entire sentences without attaching any

* On the Weight of the Human Brain, and on the Circumstances affecting it, p. 82. London, 1866.

precise meaning to them. They have neither partialities nor aversions; neither hatred nor tenderness. They see their best friends and relatives without pleasure, and they leave them without regret. Now and then they are constantly but slowly moving about, as if seeking for something; on other occasions, they will pass days in the same place and almost in the same attitude. They have little or no control over the bladder or rectum. The phosphates of the urine are diminished: there may be albuminuria. Their temperature is below the normal standard. The ultimate tendency of mania and monomania is to pass into dementia. It is a condition which is very rarely, if ever, cured; and in its last stage there is complete paralysis. Cerebral atrophy is a constant concomitant of dementia, its extent varying with the loss of mental power.

(4.) *Paralysis of the Insane.**—This important variety of mental disease has received considerable attention from physicians of late years. It is an affection sui generis: a combination of insanity with a gradually increasing loss of motor power. Not very uncommonly it is ushered in merely by symptoms indicative of a gradual waning of the intellect. More frequently, however, there are prominent delirious conceptions. These may, or may not, take the form of very exalted notions with regard to self-importance; or of extravagant delusions respecting the possession of wealth, and power, and wonderful abilities. There are also frequent attacks of frontal headache, perhaps so severe as to make the patient strike the part with his fist, or knock it against the wall; while neuralgic pains in different parts of the body may perhaps increase the suffering. With all this there are the symptoms of progressive paralysis of the muscular system. The disease has been thought to be caused by sexual excesses, intemperance, and those evils which result from leading "a fast life." A history of hereditary tendency to insanity is often to be procured. Excessive or prolonged emotional agitation exerts an influence in producing it. The disorder rarely occurs before the age of forty; while it is the general opinion that men are much more liable to it than women. According to Foville, 31 general paralytics (22 males and 9 females) were found in 334 insane.

Esquirol first drew attention to the incurable nature of this malady; and we now know that paralytic lunatics seldom live more than from one to three years. Perhaps the progress of the disease has now and then been arrested, but only for a time. At whatever period the paralysis supervenes its commencement is generally unmarked by any striking symptoms, beyond the marked weakness of the intellectual powers, or the delirious conceptions already mentioned; while it may come on in any variety of mental disease, increasing as the power of the mind diminishes. The first direct indication is commonly an impediment in the movement of the lips and tongue; the articulation becoming muffled and imperfect. This impediment increases, so that there is confirmed stuttering or mumbling. It is followed by tottering, uncertain, and vacillating movements in walking; or the impairment of locomotion may even be the earliest symptom. The same difficulty exists in co-ordinating the movements that is seen in locomotor ataxy. The handwriting is changed. The affected muscles always contract under the influence of galvanism. Then also, there is want of expression in the countenance—a heavy vacant look; the intelligence and judgment are greatly lessened; while fits of irritability, hallucinations, and illusions are common. There is loss of memory; a marked falling off in

* The synonyms of this disease are numerous. The principal are, General paresis [Πάρεσις = want of strength, from παρίημι = to relax]; Insanity with general paralysis; Progressive paralysis of the Insane; Paresifying mental disease; Dementia paralytica; Paralysie générale incomplète; and Geisteskrankheit mit Paralyse.

disposition, especially as regards energy and decision; with great debasement of the moral character. The pulse gets feeble and frequent; the tongue on being protruded moves tremulously from side to side; usually the mobility of the pupils is lessened and often they are of unequal size, or one pupil may be dilated and sluggish while the other is permanently contracted; the excretions escape involuntarily either from want of attention, or from paralysis of the sphincters; and there is exaltation of the mind, with the formation of childish hopes and schemes. Epileptiform convulsions are apt to occur. Hemiplegic seizures, attended with convulsions or coma, are not uncommon; but they generally pass off after the use of stimulating enemata, and the removal of any collection of hardened fæces. According to Dr. Allbutt, an ophthalmoscopic examination of the eyes shows an atrophic condition of the optic nerves, through the whole course of the disease, in nearly every case. As the disorder progresses, the patients become unable to articulate a single word; they continually grind their teeth, often producing a most discordant noise during the stillness of the night; their weakness is such that they cannot walk or even stand; bed-sores form upon the back; all traces of intelligence become abolished; they get motionless and insensible; and their torpid existence is reduced to a kind of slow death, unless they happen to be more quickly carried off by diarrhœa, bronchitis, pneumonia, or some other complication.

Concerning the exact nature of this disease much has yet to be learned. Dr. Conolly says: "It appears to originate in a general affection of the brain, scarcely indicated after death by more than greater softness or greater firmness, general or partial, of the cerebral substance, and by ventricles full of serum, combined merely with other appearances common to all chronic cases of mental malady: and it leaves the practitioner, after the longest reflection, ignorant of its primary nature, and helpless as to its cure."* Since this was written Wedl has demonstrated that in every instance there is hypertrophy of the connective tissue of the small arteries and veins in the pia mater and cortical portion of the brain. In consequence, there follows degeneration of the vascular walls; and hence derangement of the circulation, with disturbed nutrition. The increasing and destructive formation of connective tissue in the cortical substance, leads to the destruction of nerve-cells and nerve-tubes.† Dr. W. H. O. Sankey, who shows by the by that the credit thus given to Wedl is in reality due to Rokitansky, states that an examination of the capillaries in about twenty cases of insanity, of which seven were from patients who died of general paresis, has led him to the conclusion that these vessels in the cortical substance are more or less diseased in every case of this form of paralysis.‡ The morbid state consists of some degree of tortuosity; amounting to a curve or twist, a kinking of the vessel, or the formation of little varicose knots. And lastly, in protracted cases of general paralysis Mr. Lockhart Clarke has also found the spinal cord more or less affected. Sometimes, parts have been softened to the consistence of cream: in other instances numerous areas of granular and fluid disintegration within and around the gray substance, have been discovered.§

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* On the Treatment of the Insane without Mechanical Restraint, p. 72. London, 1856.

† Beitrage zur Pathologie der Blutgefässe. Wien, 1859. Quoted from Dr. Ernst Salomon's essay on The Pathological Elements of General Paresis. Translated from the Swedish by Dr. W. D. Moore. London, 1862.

‡ The Pathology of General Paresis. (Reprinted from the Journal of Mental Science, No. 48), p. 21. London, 1864.

§ The Lancet, p. 230. London, September 1st, 1866.

With regard to treatment, all that can be done is to relieve any painful symptoms, to give sleep by large doses of henbane, and to support the strength by a nourishing diet and warmth and cleanliness. Mr. Austin states* that when the patient is not very feeble, twenty grains of the extract of henbane is not too large a dose to begin with: and that this quantity may be gradually increased to thirty grains, twice or thrice a day.

(5.) *Idiocy.*—This condition is characterized by partial or complete absence of the intellect, owing to imperfect organization of the brain. It is congenital. The mind is not developed: there are no ideas, or they are few. The manners are childish, with occasional transient gusts of passion. The countenance is vacant, and void of aught approaching to intelligence. The articulation and the gait are often imperfect. And occasionally the idiot [Ἰδιώτης = a private individual,—one unfit for society] is a blind deaf mute.

Curious examples are recorded of the recovery of idiots after some injury to the head, which though inexplicable are not therefore to be discredited. Dr. Prichard says: "I have been informed on good authority that there was, some time since, a family consisting of three boys, who were all considered as idiots. One of them received a severe injury of the head; from that time his faculties began to brighten, and he is now a man of good talents, and practices as a barrister. His brothers are still idiotic or imbecile. Van Swieten mentions the case of a girl who was imbecile till she received an injury of the head, and underwent the application of a trephine for the removal of a depressed portion of skull; she recovered and became intelligent. Haller has reported the case of an idiot whom a wound in the head restored to understanding."† Dr. Forbes Winslow notices the history of Father Mabillon, who was said to have been in his younger days an idiot, and to have continued in this condition until the age of 26. He then fell with his head against a stone staircase, and fractured his skull. He was trepanned. After recovering from the effects of the operation and injury, his intellect fully developed itself. He is said subsequently to have exhibited "a mind endowed with a lively imagination, an amazing memory, and a zeal for study rarely equalled."‡

The weight of the brain of an adult man may be estimated at about 48 ounces, or 3 lbs. avoirdupois (see pp. 287, 335). Dr. John Thurnam weighed, or caused to be weighed, the brain of nearly every insane patient who died under his care. Thus he accumulated notes of 470 cases. Before taking the weight, the cephalo-spinal fluid, effused serum, and blood were allowed to drain away; the dura mater was removed; but the arachnoid and pia mater were retained. The weights are given in ounces (avoirdupois) and tenths. The average weight of the brain, for all ages, in the insane (including idiots and congenital imbeciles), as deduced from the tables, is as follows:

	Brains of Men. oz.	Brains of Women. oz.	Excess per cent. in Men.
Cerebrum,	40.2	35 6	12.
Cerebellum,	6.	5 4	10.
Encephalon,	46.2	41.	12.

The maximum weight of the encephalon in man, out of 257 cases, was 62

* General Paralysis: its Symptoms, Causes, Seat, &c., p. 208. London, 1859.

† A Treatise on Insanity, and other disorders affecting the Mind, p. 203. London, 1835.

‡ On Obscure Diseases of the Brain, and Disorders of the Mind. Second Edition, p. 433. London, 1861.

oz. The minimum was 32 oz. The maximum weight of the encephalon in women, out of 213 cases, was 53.2 oz. The minimum, 30.7 oz.

With regard to idiocy and brain-weight, the following cases may be noticed: Dr. Peacock found the brain of an idiot boy, who died of scarlet fever when nearly eleven years old, to balance only 21 oz. 3½ dr. avoirdupois; its proportion to the whole body being as one to 16.2. Dr. Todd also dissected the brain of an adult idiot, which was 20¼ oz. avoirdupois: Dr. Tuke mentions the case of an idiotic female, who died at the Retreat at York, at the age of 70, in whom the brain weighed 23¾ oz.: Dr. Down found the brain of an idiot boy, 18 years old, who died at Earlswood, to be only 15 oz.: in the Museum of St. Bartholomew's Hospital there is the brain of a male idiot, aged 22, which weighed 13 oz. 2 dr. avoirdupois. Lastly, Professor Marshall has given an account of the brains of two idiots of European descent,—one, that of a woman, who died of phthisis at the age of 42, and whose recent brain without the membranes weighed 10 oz. 5 grs.; the other, that of a boy, who died when twelve years old of spinal and pulmonary abscess, and whose fresh brain with the membranes weighed only 8½ oz.*

3. PRINCIPAL CAUSES.—These are often very difficult to detect. Insanity is no doubt frequently hereditary; or it can sometimes be traced to marriages among near relatives, "breeding in and in," as the farmers say; or it may perhaps be due to syphilis in the system of the parents, or to drunkenness on their part, or to scrofula and tubercle. Defective mental education—imperfect training of character, parental mismanagement, the encouragement of too eager a desire for learning or riches, or worldly position, as well as the fostering of extreme religious feelings, are all so many predisposing causes of mental alienation. Among the more immediate causes are injuries of the head; the abuse of alcohol, or of narcotics—as tobacco and opium; sexual excesses, and particularly masturbation; somewhat rarely, perhaps, continence; fevers; and the retrocession of erysipelas or gout in persons predisposed to insanity. Then there are certain moral causes, as blighted ambition, disappointment in love, distorted views on the subject of future rewards and punishments, immoderate grief, long-continued anxiety and distress, prolonged intellectual exertion, and pecuniary reverses. I think it is Dr. Noble who remarks, that the more advanced the civilization of any community, the more abundant are the diseases of the mind. Humboldt states that he looked in vain for cases of insanity among the native Indians of America. But in this remark he probably referred to acute mental disease; since savages, like children, may surely suffer from congenital imbecility or idiocy.

A disregard of everything but self—a forgetfulness of his due relation to all other creatures, is a characteristic of the lowest order of man. "All the diseases of the mind leading to the fatalest ruin consist primarily in this isolation. They are the concentration of man upon himself, whether his heavenly interests or his worldly interests, matters not; it is the being *his own* interests which makes the regard of them so mortal. Every form of asceticism on one side, of sensualism on the other, is an isolation of his soul or of his body; the fixing his thoughts upon them alone: while every healthy state of nations and of individual minds consists in the unselfish presence of the human spirit everywhere, energizing over all things; speaking and living through all things."† If we seek for an illustration of

* Philosophical Transactions of the Royal Society of London, vol. cliv, p. 527. London, 1865.

† Modern Painters. By John Ruskin, M. A., &c. Vol. v, part ix, chap. ii, p. 206. London, 1860.

mental disease thus set up, we shall find it in the insanity of women. Man having selfishly and uncharitably appropriated the right of entering and working in the various labor markets, the so-called weaker sex has become practically debarred from all honorable occupation. Women being educated with but one purpose, that of marriage, what is to befall them if they fail in their aim of life; or if their wedded portion prove only a misery and debasement? Having no healthy life-giving career, driven to a morbid egoism, perhaps carried away by ungratified sexual passions, is it to be wondered at that so many of the sex suffer from all forms of nervous disorder,—passing through the various grades of restlessness and irritability and hysteria, until their wretchedness finally culminates in madness.

One undoubted cause of insanity, though only recognized of late years, is defective nutrition of the brain. The ultimate effect will be the same whether there exist a morbid condition of the blood, or some obstruction to the capillary circulation. The nervous centres require a rapid renewal of healthy arterial blood: if the blood be impure (as from use of alcohol, opium, chloroform, &c.), or if congestion take place, mental activity ceases. Want of refreshing sleep interrupts the restoration of nervous force most seriously; and many patients, after recovery, have attributed their disease either to complete insomnia, or to their repose having been long disturbed by frightful dreams. Those slumbers which are "but a continuation of enduring thought," must necessarily be quite opposed to the nutritive regeneration of that part of the cerebral organism on the action of which the emotions depend.

In individuals predisposed to insanity, local irritation may give rise to an attack. In a case which I saw a few years ago, a large abscess in the loins had this effect. I have also observed severe hysterical mania result from acute ovaritis, the mental disease ceasing as the ovarian pain was relieved.

Men and women suffer in nearly equal proportions from insanity. In this country the females under control are somewhat in excess of the males. It must be recollected, however, that in England and Wales, the women are in excess of the men. Thus, in the middle of 1866, the estimated population was $\frac{\text{Males } 10,273,700}{\text{Females } 10,936,320} = 21,210,020$. The age at which mental disease appears to be most common is between twenty-five and fifty: in women, perhaps between thirty-five and forty-eight, and in men between twenty-five and fifty, when the nervous system is often most severely taxed.

4. DIAGNOSIS AND PROGNOSIS.—The *diagnosis* of insanity is, on many occasions, attended with great difficulty. In examining a lunatic, we may perhaps find that several of his actions are not more extravagant than those of many peculiar though sane men; but we shall probably learn from those about him that his conduct is totally at variance with that which he manifested prior to his attack. In short, the individual is not what he was. There has been a gradual change of demeanor, perceptible to all acquainted with him; while no satisfactory reason can be given for the alteration. Thus the temperate man has more or less gradually become a drunkard; the good husband has given himself up to every kind of licentiousness; the individual with kind friends has become imbued with the belief that every one's hand is against him. I have known a gentleman, remarkable for his morality and tenderness of disposition prior to the setting in of mental disease, boast of "keeping several women," and while informing his wife of the fact, reproach her harshly for her tears, remarking that he could not see what she had to complain of. Frequently, there is some difficulty in finding out the patient's delusions, and on this point

we have to make close inquiries of the friends. But with regard to all hearsay evidence, both as to the antecedents and the existing state, the physician must be cautious; inasmuch as, without any wish to deceive, it often happens that the friends have a bias towards which they may unconsciously lean.

When insanity is feigned, the trickster may usually be detected. Give him time, and he is certain to betray himself. He overacts his part, performing antics which he thinks are characteristic of lunacy, but which are never seen in an asylum. It becomes tolerably clear that he, being a sane man, wishes to be thought mad; he is violent, incoherent, talks absurdly on many topics, and makes exertions which quickly tire him. The lunatic, on the contrary, shows no evidence of fatigue for a long time; he talks rationally on several subjects, and takes all the pains he can to be regarded as sane. The difficulty is greater if the impostor maintain a sullen silence; but even then he will surely be found out by carefully observing him when he believes himself unseen.

It has long been known that the insane are prone to suffer from changes in the form of the external ear, and particularly from sanguineous tumors (*Hæmatoma auris*) about the outer surface of the auricle. By some, these have been attributed to mechanical violence, but this opinion seems untenable. The peculiar condition is often symmetrical. Dr. Laycock, after a careful study of the symptomatology of the ear, has come to these conclusions: "1. That the states of the circulation, nutrition, and development of the tissues which make up the ear-lobule, and cover the helix, very commonly coincide with similar conditions of the encephalic tissues. And 2. That the development of the cartilages of the external ear, and of their several parts, is in relation with the encephalic and cranial development of the individual."*

This is hardly the place perhaps to enter upon the consideration of the treatment of lunatics in our courts of law. But it is impossible not to see that in this matter there is a decided leaning to undue severity. A scientific witness may entertain no doubt as to the insanity of a particular criminal, and yet if he cannot assert that the prisoner at the time of his committing the act was ignorant of the wrong he was doing, the law will not heed the evidence. In many instances the life or death of a man rests upon the answer given by the physician to this question—Did the prisoner know the difference between right and wrong when he committed the crime? If the principle here involved were acted up to generally, half the asylums might be closed for want of inmates. Why the whole management of lunatics in the present day depends upon moral control—upon teaching them that they must behave properly. But daily experience proves that a man may be quiet and harmless in an asylum, who would be very dangerous if he were his own master. A madman bent on committing suicide knows that it is a wrong act, and will regret his tendency to it, and beg to be restrained. Yet the next hour he may attempt self-destruction. A wise and benevolent dispenser of justice should endeavor to learn if the general tenor of the man's life has been that of a sane or insane man; whether there has been any gradual alteration of character, and if any cause has been in action likely to induce imperfect nutrition or actual disease of the brain. In short, he should be bent upon simply discovering the truth, in a possibly obscure case, rather than of confounding "the mad doctor," and exposing him as an enemy to society. No lawyer, however great his general abilities and legal knowledge may be, should expect to be able to form a sound

* Medical Times and Gazette, p. 289. London, March 22d, 1862.

opinion as to whether a given individual is or is not of unsound mind, without having studied the subject of lunacy. Hence, science and humanity alike demand that if the judges are to define in set terms what is meant by insanity, they ought first to visit the asylums and watch the behavior of their inmates. They might then see how variable in kind and degree are the symptoms of brain diseases; while they would likewise learn that it is no more absurd to believe that some of these disorders lead to "uncontrollable impulses," than that certain other affections of the nervous system interfere with the power to govern choreic and sundry irregular muscular movements.

With regard to the *prognosis*, it may be said that it is more favorable when an acute disorder of the whole system, or some cerebral malady attended with fever, has constituted the beginning of the mental aberration, than it is in those cases where the alienation of mind has slowly exhibited itself (perhaps almost imperceptibly at the onset) and advanced progressively to confirmed insanity. At the same time it must be remembered that one attack predisposes to another. The recovery may appear complete; but often the malady is only dormant, and slight causes will serve to rekindle it, perhaps in an aggravated form. Of the cases discharged as cured from the public asylums, probably at least one-fourth relapse.

Where physical violence sustained by the head is the cause, the prognosis is uncertain, inasmuch as very severe lesions of the encephalon may thus arise. Moreover, where the mind has been overthrown by sudden and severe calamity, the prospects of recovery are great. Again, if the mind breaks down after protracted cares, the case is bad; especially if the physical energies also become depressed. When insanity is complicated with general paralysis or with epilepsy, it is generally quite hopeless. Probably more cases of mania are cured than of any other form of insanity; the likelihood of restoration being very much greater in the earlier than in the advanced periods. Melancholia, however, if the patient be properly and promptly treated, often proves curable. According to Esquirol the most favorable age for recovery is between twenty and thirty, few being cured after fifty. Most authors assert that insanity in women is more curable than in men. And lastly, when the mental disease is connected with some bodily disorder which admits of removal by the progress of age, or by medical treatment, the grounds for hope are much increased. To form a correct prognosis, no link in the chain of circumstances must be overlooked. Dr. Noble well observes: "The causes, moral and physical, predisposing and exciting; the history of the invasion and progress; the actual state, and the reactions taking place under influences of every kind,—must all be known and rightly appreciated if an opinion is to be formed of the slightest value."

In advanced insanity, when the patient is happy in his delusions, he often gets robust; for he sleeps nine or ten hours out of the twenty-four, his appetite is good, he takes no heed of the future, and his morbid ideas give him no trouble. It is an unfavorable symptom for the bodily health to improve, without the mental disease becoming at all alleviated.

A common cause of death in the insane is some disease of the thoracic viscera, especially of the organs of respiration. The slightest symptom of bronchitis or pneumonia ought to claim attention. To prevent any insidious development of phthisis from being overlooked, it is well to weigh each patient (especially in large asylums) every month.

Supposing recovery to take place from acute insanity, the time which has intervened between the onset of the disease and its termination now and then appears like a sleep; or it is perhaps regarded as a frightful dream.

When George the Third, in November, 1810, had so far recovered from an attack of mania as to be able to receive a visit from the Lord Chancellor, he inquired of his physicians how long he had been ill. On being told that it was some eighteen days, he replied that he had no recollection of the time. This, he said, had been the fourth blank in his life; at the same time enumerating his three former illnesses and the length of time they had lasted.*

1. **PATHOLOGY AND MORBID ANATOMY.**—The two chief postulates as to the nature of insanity which are entertained in the present day are—the *metaphysical* or *spiritual* theory, and the *cerebral* hypothesis. The first conjecture, that insanity is a disorder of the immaterial principle, and not of the material instrument by which the mind manifests itself, seems untenable; although it has been adopted by many psychologists. The second theory is the only plausible one, viz., that the brain, or nervous structure on which all mental action is dependent, is the part affected.

According to the observations of many physiologists a general agreement seems to be now arrived at, that complexity and richness of the convolutions, depth of the sulci, and thickness of the gray matter, are the conditions found where there has been high intelligence. In the drawings and descriptions given by Professor Wagner of the brains of five men eminent in different branches of science, the complex arrangement of the convolutions is certainly remarkable. Consequently, it is to these parts we direct our attention in cases where there has been morbid mental action. The cerebral disease may be such as is visible on examination after death, or it will consist of some change which we cannot discover. If the brain be imperfectly nourished, through any morbid condition of the blood, we may have diseased action without any structural change being left which can be detected by an ordinary examination. Schroeder van der Kolk says, however, that he does not remember to have performed the dissection of a lunatic during the last twenty-five years, without finding a satisfactory explanation of the phenomena observed during life. And, indeed, it seems far from impossible, that in the course of time, as chemical analysis in conjunction with microscopical investigation gets perfected, we may become acquainted with the changes which occur in the nerve-cells; so that the brain of a lunatic being given, the pathologist shall be able to say exactly what the main features of the disease have been—whether there has been intellectual disorder, or melancholia, or idiocy, or failure of memory, &c.

The retrograde changes of tissue which have been most frequently found in the brain after insanity consist of softenings of the gray substance, perhaps reducing parts of the convolutions to a mere pulp; of an increase in the amount of connective tissue, and consequent atrophy of nerve-cells; together with fatty, amyloid, pigmentary, and calcareous degenerations, occurring in the walls of the smaller vessels, in the nucleated cells of connective tissue, and in the nerve-cells. There may be an increase in the volume and consistence of the whole cerebrum; or a state of atrophy, affecting one or more convolutions, or the entire cerebral mass; or an œdematous condition, with cerebral anæmia. The ventricles too are frequently found somewhat dilated, and containing more fluid than in health; this being especially the case in acute insanity from drunkenness. An indurated condition of the nervous substance, making the texture as firm as cheese, is generally the result of hypertrophy of the connective tissue.

* Memoirs of the Life and Reign of King George the Third. By J. Heneage Jesse. Vol. iii, p. 557. London, 1867.

With regard to the alterations in the brain-case, it need only be noticed that the bones of the skull have sometimes been found abnormally thick; the hypertrophy of osseous tissue being important or not, according as it has affected the intracranial space. Syphilitic exostosis, as well as osseous tumors, may be present. The dura mater is occasionally appreciably increased in density, and at the same unduly adherent to the inner table of the frontal, parietal, and occipital bones. The arachnoid will frequently be opaque in parts, thickened, and congested: extravasations of blood into the sac of the arachnoid, or hæmatomata, are said not to be uncommon in cases of general paralysis. After violent mania, intense congestion of the pia mater has been seen in conjunction with a red coloration of the subjacent cortical substance. Under other circumstances, this vascular membrane has been found in a pallid anæmic state: it may also present an œdematous condition.

The observations of Drs. Bucknill and Sankey, on the brains of the insane and the sane, give us the following results: (1.) The absolute weight of the brain is increased in insanity, though the absolute size relatively to the capacity of the cranium is diminished. (2.) The greater heaviness depends upon increased weight of the cerebellum, compared with the cerebrum, pons, and medulla oblongata; so that the cerebellum is heavier in relation to the cerebrum in the insane than in the sane. (3.) The increased weight of the cerebellum is found to be the greatest in general paralysis, and least in acute mania; the first being a disease of very much longer duration than the second. (4.) The specific gravity of both the gray and white portions of the brain is increased in the insane. (5.) Dr. Bucknill seems to think that the most essential change consists in the existence of two kinds of cerebral atrophy, namely, that which is positive, and that which is interstitial or relative. By positive atrophy he indicates an actual shrinking of the brain; while by relative atrophy, which may or may not be coexistent, he means an interstitial change, wherein the active cerebral molecules suffer diminution, inert materials being deposited.

It must not be thought because structural disease of the brain exists, even to a considerable extent, that amelioration of symptoms may not take place for a time. As a fact, amendment does now and then occur, especially shortly before death. Sir Henry Holland* alludes to a case of mental derangement (and says that he has met with similar instances) where the post-mortem examination showed great organic changes in the brain; many of them, obviously of long standing, and upon which it was next to certain that the symptoms depended. Yet in this instance there occurred not long before death a lucid interval, so far complete and prolonged as to afford hopes of recovery where none had existed, and where the event proved that none could be reasonably entertained.

6. GENERAL TREATMENT.—Assuming that the physician is fortunately consulted when the symptoms are merely threatening, he may often effect a cure. This is to be attempted by quieting the nervous system; by insisting on rest from all professional and mercantile pursuits; by taking care that there is a due amount of sound sleep in every twenty-four hours, and by attending to the functions of the skin, liver, kidneys, and alimentary canal. Where there is no symptom of active disease in the head, morphia or extract of opium often proves invaluable; or Indian hemp, henbane, stramonium, or chloroform, may be useful. Some forms of excitement are best treated by thirty-minim doses of tincture of digitalis, repeated every

* Chapters on Mental Physiology. Second Edition, p. 68. London, 1858.

eight or twelve hours. If the vital powers be depressed, tonics—such as quinine and iron, phosphate of zinc and nux vomica, hypophosphite of soda and bark, cod-liver oil, &c., must be given. The diet is to be nourishing, and the amount of stimulants to be regulated. Gentle travelling amidst beautiful scenery may be recommended, especially if the patient can be accompanied by an affectionate and judicious relative.

On examining a person supposed to be insane, the duty of a medical man, as Dr. Conolly has pointed out, is twofold, viz.: 1st, to determine whether the individual in question be of sound mind; and 2d, to give an opinion regarding the treatment required, and especially concerning the necessity of restraint and its degree and nature. The practitioner will have learned from the preceding observations how to answer the first question. With respect to the second (the medical treatment) it must of course depend upon the state of the patient; but it may be positively asserted that under no circumstances can an antiphlogistic course of remedies be borne.* Even when exacerbations occur at the menstrual periods, and the flow is scanty, we must not do more than apply a few leeches to the neck of the uterus, while nourishing food ought to be freely allowed to prevent the loss of blood from causing general depression. Indeed, our general object clearly must be to restore and maintain the bodily functions; while we also remove any disorders in other parts of the system, such as skin diseases, uterine disturbances, gastric and intestinal irritations, &c., which may be connected (or coexistent) with the cerebral affection. We shall perhaps persevere the more when we remember that many lunatics have been cured by improving their general health, even after suffering for some years. In an ordinary case of insanity, I should especially take care that the patient had a nutritious diet, warm clothing, outdoor occupations and amusements, healthy evacuations from the bowels, and sound sleep at night. Attention would quietly be paid so as to prevent all bad habits, as onanism, &c.; persevering attempts would be made to give repose to the nervous system; I would endeavor to impart power to the body, if necessary, by tonics; and then at length would gently try to revive the affections, to send a glimmer of hope into the dark spirit, as well as to strengthen the bewildered intellect. While following such a plan as this no mechanical restraint ought on any account to be resorted to, and as much cheerful occupation and recreation should be afforded as the lunatic could beneficially enjoy.

From this it will seem that stimulants, tonics, mild warm purgatives, and narcotics (especially opiates, in combination or not with belladonna, or Indian hemp, or henbane) must usually prove invaluable remedies. The subcutaneous injection of morphia (F. 314), with or without a small dose of atropin, can be practiced without fear or trouble. The douche, shower, or simple warm bath may perhaps be used, but only according to the ordinary principles of medicine. The regular employment of the Turkish bath

* This opinion is in its main features acquiesced in by all physicians. One of the most careful recent writers on this subject draws the following conclusions from his experience: Insanity, in any form, is not of itself an indication for bloodletting; on the contrary, its existence is of itself a contraindication; hence, the person who is insane should, other things being equal, be bled less than one not insane; insanity may coexist with plethora, a tendency to apoplexy or paralysis, and sometimes sthenic congestion or inflammation, which call for the abstraction of blood; therefore venesection in mental disorders should not be absolutely abandoned, although the cases requiring it are very rare. As a general rule *topical* is preferable to *general* bleeding. Insanity following parturition, other things being equal, is to be treated by bleeding less frequently than that which has its origin in other causes. An Examination of the Practice of Bloodletting in Mental Disorders. By Pliny Earle, M.D. New York, 1854.

is often of service, partly by improving the function of nutrition, as is evidenced by a gradual increase of weight. In acute mania especially, the wet-sheet packing (F. 136), with a full dose of henbane, will often prove most useful. The diet of the insane should undoubtedly, as a rule, be generous and of the most nourishing kind. It not unfrequently happens that all food is refused, especially perhaps by those who have morbid ideas on religious subjects. Such patients will fancy that they are commanded to fast, and will perish from inanition rather than disobey the imaginary precept. In other cases the functions of the stomach and bowels are deranged, and the refusal is merely due to complete loss of appetite; the food being eagerly taken when the intestinal evacuations have become free and healthy. If we can, therefore, find any physical cause for the abstinence, it must of course be removed; but otherwise we may try and persuade the patient to eat by tempting him with dainties, or by putting food where he can help himself when unseen, or by feeding him with a spoon like a child. These plans failing, we must resort to *forced alimentation* to sustain life. This may be effected by injecting nutritious fluids through the nasal passages or by the mouth. If we adopt the first mode, it is only necessary to have a funnel with a long flexible tube attached to it; which tube, on being passed through the posterior nares and œsophagus, will convey any liquid by simple gravitation. In the second case, while the patient is firmly held by two or three attendants, we employ the gag and stomach-pump; by means of which I have often injected mixtures of strong beef tea, milk, bark, cod-liver oil, brandy, and flour. The use of nutrient enemata in these cases is not advisable.

As regards the moral treatment of insanity, no rules can be of universal application. I will only say, therefore, that it ought to be regulated by kindness and a feeling of sympathy with misfortune, and that no harshness or means which induce fear should be tolerated. Any practice, moreover, which is meant to supersede constant personal surveillance on the part of the nurses is bad. The faulty habits of the insane are to be met by careful management, by unwearying attention. Attendants who are impatient, who will not take trouble, who cannot sacrifice their own comfort to duty, have mistaken their calling. There is too much reason to fear that many of the patients in public and private asylums are even now sometimes cruelly ill-used. Uneducated and coarse keepers seem incapable of understanding that kind words and encouraging smiles are more efficacious than blows and curses. A convalescent who was an eye-witness of the misery caused by rough hands, and who had to look on while one attendant flung a lunatic on the floor and knelt upon him, while a second wrenched open the mouths of helpless patients and crammed the food down their throats, while a third threw the potatoes and hunches of bread and butter upon the table as if they were bricks, &c., and while a fourth irritated and knocked about a poor nervous fellow who rebelled against being undressed,—this witness says,—"The doctor never saw these things—how could he? He was never there, but when, like the hands of a clock, the appointed hour was come, or when sent for, *then* all things were straight, the rooms were still, and the speech as soft as any silk. His rule was regularity; his guide, punctuality. To see everything clean and beautiful and trim was his hobby—to make them *appear* so, the attendants' aim."*

Concerning the physician's bearing, few I hope will deem it in bad taste if I venture to urge that he should endeavor to obtain the confidence of his unfortunate patients. In this he will be successful by showing an interest

* Life in a Lunatic Asylum: an Autobiographical Sketch, p. 68. London, 1867.

in their well-doing, by listening to the recital of their ailments, by never making a promise without keeping it, by visiting them at unexpected times so as to see that they are properly cared for, and by allowing as much indulgence as is compatible with the proper treatment of their disease. He ought to remember that although lunatics are frequently shy and nervous, yet they are often prompt and acute to see through any mystification; that they appreciate truth and fair dealing; and that any attempt to deceive them is sure to weaken his power over them. Then, if he have a pleasing and friendly address, with kind but firm manners, he may feel confident of maintaining a greater degree of influence than can ever be acquired by severity. It can rarely, if ever, be advantageous to reason with a lunatic presenting acute symptoms. But when recovery has commenced, when the patient may be said to be convalescent, then his questions should be kindly considered; the semblance of treating his observations and complaints with contempt must be guarded against; while his natural longing for home ought to be combated by urging the disadvantage of returning there too soon. Dr. Noble mentions the histories of three inmates of an asylum, each of whom fancied himself the Holy Ghost. On their being brought together, one was cured of his delusion: he saw there could not be three Holy Ghosts. But I cannot suppose that Dr. Noble regards the discussion as the agent that effected the cure, if indeed a cure was effected; for it is not stated whether there were other delusions, or what was the ultimate result of the case.

The existence of any degree of insanity is sufficient to render an individual incapable of executing a will. According to the law, as explicitly laid down by Sir James Wilde in the case of Mrs. Tebbitt against the legatees of Mrs. Thwaytes, August, 1867: "A person who is the subject of monomania, however apparently sensible or prudent on all subjects and occasions other than those which are the special subject of his apparent infirmity, is not in law capable of making a will."

In order to render restraint imperative, I believe a lunatic should either be dangerous to himself or to others; or else seclusion must be deemed necessary as part of the curative treatment. Although the quiet and regular mode of life led by patients in well-ordered asylums is often most efficacious as a remedial agent, yet I am thoroughly convinced that many institutions contain harmless though incurable lunatics, who would be much happier and in no degree injured by residence elsewhere; but who, unfortunately, have relations and friends that will not be troubled with them. At the same time I am not an advocate for either qualified or unqualified medical practitioners receiving single cases of mental disease into their homes. The experience of the Commissioners of Lunacy has shown conclusively, that in many instances where this plan has been adopted, the treatment has proved positively injurious.* What might in all probability answer well, if placed in healthy rural districts, would be

* When a medical man receives a patient of unsound mind into his house, he must take care to obey the law of the land. The Commissioners of Lunacy have very properly shown their determination to insist on the salutary provisions of the Lunacy Acts being carried out; and it is certainly quite time that all violations of the statute should be punished. Over and over again it has been stated by the public press that, although the friends of a lunatic have a right to take care of him themselves, if there is no other person in the house similarly affected, and if no profit is made out of the charge; still, if any person takes a lunatic into his house and derives profit from so doing, he must comply with all the provisions of the Act of Parliament. He is bound to have an order, and two medical certificates; while it is also imperative that he should send a statement of the particulars of the case to the Commissioners in London.

colonies for the insane, like that of Gheel, in Belgium; where patients could be allowed to enjoy a certain amount of liberty, and to mix with the families in the farmhouses where they boarded. At all events, modifications of the present system are needed. For although very much has been done within the last few years to improve the appearance and character of our asylums, nevertheless much remains to be accomplished. They are not yet properly converted into *Hospitals for the Cure of Insanity.* The sites of several are bad. The buildings, in too many instances, still retain to an injurious degree the look and nature of prisons; while the parsimonious way in which some are furnished, and the especially wretched appearance of many of the night-cells, are circumstances positively disgraceful. The days of rotary chairs, manacles, stripes, head-shaving, baths of surprise, prolonged and violent shower baths, chambers without bed or bedding, dark rooms—in short, of punishments of all kinds—have, it is to be hoped, gone forever. Nevertheless, if any one doubts that we have yet much to do, let him read the suggestive and valuable Reports of the Commissioners in Lunacy.

IX. HEADACHE.—VERTIGO.

1. **HEADACHE.**—Headache, or technically cephalalgia [Κεφαλή = the head + ἄλγος = pain] is of common occurrence; since it is present as a prominent symptom during some part of the progress of most acute, and of many chronic diseases. The pain or uneasiness is usually in the head; although it is often hard to be distinguished from the suffering connected with rheumatism, or neuralgia, or inflammation of the scalp, or with syphilitic affections of the pericranium and bone.

Four principal varieties of headache may be noticed. Arranged in the order of their importance, they may be thus treated of: The first, or *organic headache*, is due to disease of the brain or its membranes, and especially of such in an early stage. It is generally accompanied by attacks of vertigo, occasionally by fits of vomiting, sometimes by confusion of the mind, and frequently by rumbling noises or murmurs in the ears. The pain may be sharp or dull, lancinating or throbbing. Diseases of the meninges are attended with more severe headache than those of the nervous substance itself. In abscess, as well as in cancerous tumors of the brain, paroxysmal attacks are common. Dr. Forbes Winslow appears to confirm the opinion of Hasse, that pain in the head always exists in central softening of the cerebrum involving the corpus callosum, septum lucidum, fornix, and the ventricular parietes. When due to inflammation, the pain is often most intense; while it is confined to one portion of the cranium, is increased by warmth, or movement, or noise, and is lessened by elevating the head. At times it remits in severity. There are no symptoms of gastric disturbance, or of sluggish action of the liver.

The second, or *plethoric headache*, is dependent upon fulness of blood: the cerebral vessels become congested. There is a sense of pulsation in the ears; together with giddiness on stooping. Persons who live too freely, who take but little exercise, who rise late in the morning, &c., are liable to it. This variety afflicts robust middle-aged men who "make blood too fast;" as well as plethoric women with irregularity of the catamenia. Certain forms of cardiac disease, by retarding or hindering the return of blood from the brain, may set up venous congestion and headache.

The third, or *bilious headache*, will either be temporary or constant. When temporary, it generally arises from some unusual excitement, or an error of diet—any excess either in food or wine; while it is most severe in the morning on awaking from an unrefreshing sleep. The suffering for the time is often great. There is perhaps an inability to keep the head on the pillow, and yet every attempt to sit up brings on violent retching. The throbbing is so violent, that each beat seems to lift the head from the pillow. One patient compared this pulsation to the force of steam raising the lid of a kettle up and down as the water boils. Fortunately, in the course of twelve or twenty-four hours all uneasiness passes off as the cause ceases. The constant sick headache occurs in persons of weak stomach, who are almost always suffering from indigestion, or who have a tendency to gout. Such individuals take too little exercise, and often too much unwholesome food. The stomach and duodenum get out of order; as is evinced by the coated tongue, the offensive breath, the flatulence, the low spirits, and the nausea which exist. The hepatic functions are also ill-performed, and the stools are clay-colored; while the urine is scanty and of a brown tint. There is seldom any disposition to vomiting.

The fourth, or *nervous headache*, is often due to debility and exhaustion. Poverty of blood from renal disease, hemorrhage, &c., may induce it. The irritation of diseased stumps and decayed teeth is I believe a frequent cause; though most sufferers are either incredulous or angry when told that they ought to go to the dentist. Headache is a common symptom in valvular disease of the heart; being due to the interference with the regular and perfect supply of blood to the brain which is induced. In one variety of this disorder—known as *hemicrania* or *brow-ague*—the symptoms assume an intermittent character; the pain recurring, every day or each second day, with the same degree of regularity as a regular fit of ague. Although this form prevails in damp and marshy districts, yet it may arise in healthy parts of the country from other causes than malaria, and especially from constitutional debility. Weakly women, who exhaust themselves by over-lactation, &c., are frequently the victims of a variety of nervous headache known as *megrims;* which may assume an intermittent character like hemicrania. And, lastly, hysterical girls are very liable to a kind of nervous headache; which, when confined to a single spot, is known as *clavus hystericus*, because the pain is said to resemble that which it is supposed would arise from driving a nail into the head.

Pain in the nerves of the scalp can scarcely be mistaken for headache the result of organic disease. In the former there may be considerable sharp suffering, but it is not of the sickening and confusing and depressing nature of an inflammatory headache. Frontal neuralgia, the most common variety, has its seat in the supra-orbital branches of the frontal nerve; or the suffering may extend along the whole of this nerve (virtually the continuation of the ophthalmic division of the fifth), causing severe orbital and frontal pains. Suffering of this kind can frequently be relieved by a dose of ammonia and quinine; while a strip of muslin well moistened with tincture of belladonna mixed with a little tincture of aconite and a few drops of chloroform, and laid along the forehead, will often give immediate ease. To put off the recurrence of the attack for as long as possible, few drugs are more to be relied upon than phosphate of zinc and nux vomica (F. 414). These not succeeding, trial should be made of the chloride of ammonium (F. 60). Where this fails, steel will now and then succeed.

Headaches, of whatever kind, occur more frequently in persons of adult life than in extreme youth or advanced age; and in the brain-workers rather than among the mechanics. Their occurrence is favored by heredi-

tary predisposition. Habitual dwellers in towns suffer more than residents in the country; females more than males; the nervous and delicate more than the robust; and the middle and higher classes of society more than the lower. And then lastly, Dr. Wright says that all pains in the head "especially affect persons who neglect the many little attentions and cares that our civilized, and therefore in some measure artificial mode of life requires. I may especially instance regularity in diet, carefulness in adapting the clothing to the requirements of our variable climate, attention to the action of the bowels, and a sufficient amount of exercise, as essential objects of our care."*

The indications for *treatment* are to relieve the congestion of the head and the dyspeptic symptoms, while at the same time attempts should be made to give tone and strength to the system. The diet ought to be regulated, only such food being allowed as can be usefully assimilated. Many individuals afflicted with headaches, tremors, and restless nights, would derive great benefit from leaving off tea. Coffee is seldom as mischievous; while in some forms of sick headache it positively gives relief at the time, and also tends to keep off the attacks. I look upon tobacco in every shape as injurious where there is a tendency to headache of any kind; though I am occasionally told that a segar eases, or even dispels the pain. Mild purgatives, such as rhubarb and senna (F. 146), nitric acid and taraxacum (F. 147), rhubarb and blue pill (F. 171), podophyllin and henbane (F. 160), or alkalies with compound decoction of aloes (F. 148, 149), will frequently be useful. When the pain is connected with the gouty diathesis, colchicum is the proper remedy (F. 46). We may also often effect a cure in bilious headaches by pepsin (F. 420); or by quinine with ipecacuanha, or rhubarb (F. 384, 385), to aid digestion. In these cases also the patients must take daily exercise in the open air, and avoid too much sleep. All alcoholic stimulants, but particularly beer and port and sherry, can frequently be given up with great advantage by those subject to this kind of headache. On the other hand, in many nervous headaches, stimulants and tonics—particularly the nitro-hydrochloric acid (F. 378), are to be tried; in hemicrania, quinine or arsenic (F. 52, 379), will be needed; while in hysterical women we must resort to shower or douche baths, with nux vomica or zinc or steel (F. 394, 410, &c.).

Holding the arms high above the head produces a marked effect upon the cerebral circulation. Hence this proceeding will once in a way check troublesome bleeding from the nose; while I have frequently seen it relieve the severity of that peculiar morning headache, with which some persons constantly awake. Again, compression of the temporal arteries with a couple of pads and a bandage, may sometimes be of service. Without pretending that there is anything curative in this proceeding, I am sure it will often be the means of affording much relief at the time of greatest suffering.† In addition to the foregoing we shall occasionally have to try the effect of iced water, cold lotions, eau de Cologne, &c., to the head; the application across the forehead of a thin piece of muslin soaked in tincture

* Headaches: their Causes and their Cure, p. 12. London, 1856.

† This effect of pressure did not escape the observation of Shakspeare. When Othello, after listening to the insinuations of Iago (act iii, scene 3), tries to conceal his feelings from Desdemona by the plea that he has a pain upon his forehead, she replies, "Faith, that's with watching; 'twill away again: Let me but bind it hard, within this hour, it will be well." And so again, in the scene between Hubert de Burgh and young Arthur (King John, act iv, scene 1), the latter attempts to excite Hubert's compassion by reminding him, "When your head did but ache, I knit my handkercher about your brows, The best I had, a princess wrought it me, And I did never ask it you again; And with my hand at midnight held your head."

belladonna; sinapisms, dry cupping, or blisters, or setons to the nape of e neck; the removal of decayed teeth or stumps from the mouth; and ange of air. It need hardly be added that in *organic* headaches arising om some cerebral mischief, the disease and not the symptom must claim e greatest share of the practitioner's attention.

2. VERTIGO.—Giddiness, or vertigo [from *Verto* = to turn round] consts of a transitory sense of whirling round, or of falling. Surrounding bjects appear to be in motion. The sufferer loses his balance for a second r two, but often recovers himself without dropping, provided he can grasp me firm support; and then he asks to sit down immediately. The attack s followed by headache.

Vertigo is most prevalent in advanced life. It is perhaps a more important symptom of incipient disease of the brain than headache. When frequent seizures are complained of, they assume a really serious bearing; being generally the precursors of impairment of the mental powers, as well as of actual lesions of nervous tissue. The difficulty of relieving these seizures is painfully great.

The practitioner should always endeavor to trace the attack to its origin. In several instances it betokens general weakness; as is seen in the vertigo which arises on assuming the erect posture, during the early stages of convalescence from acute disease. It may be due to some poison in the blood; examples of which are common from the abuse of alcoholic drinks, a dose of opium, and the use of tobacco by one unaccustomed to it. Now and again it is merely symptomatic of some gastric or intestinal irritation; of some disturbance of the liver; of chronic kidney affection, particularly of such as is accompanied with albuminuria: or of disease, functional or organic, of the heart. Disease or weakness of the walls of the right auricle will give rise to vertigo, by its influence in retarding the return of blood from the brain; in the same way headache is produced. Venereal excesses cause giddiness. With women, attacks of menorrhagia often induce it; and so does prolonged lactation, more especially if the catamenia are regular.

Vertigo very frequently arises from some evident disturbance of the cerebral circulation. Indeed, any circumstance which suddenly modifies the circulation of the blood through the brain will produce it; whether the occurrence act so as to accelerate the flow or to retard it,—to cause plethora or anæmia. In the mild form of epilepsy (epileptic vertigo), the two chief, or indeed only symptoms, are giddiness and faintness. "Swimming in the head" is also often a forerunner of apoplexy and paralysis; it is an accompaniment of cerebral tumors. Paroxysmal attacks are not uncommon in the aged, unattended by other symptoms. A diseased condition of the coats of the arteries of the brain, in advanced life, is a frequent cause of very troublesome giddiness. Less commonly it is connected with a gouty state of the system.

In the majority of cases there are indications of depressed vital powers. And it must be recollected that this is the case, even when the vertigo is connected with a fulness of the cerebral vessels; the congestion consisting of passive venous hyperæmia much more frequently than of active arterial determination of blood. Hence, as a rule, tonic and antispasmodic remedies are more frequently called for than those which have a tendency to lower the system. The latter, however, will be needed in persons of a full habit of body; in those whose heads are hot and throbbing, whose arteries are pulsating with undue force, and who complain of buzzing noises in the ears. In such, a plain nourishing diet without any alcoholic stimulants,

mild doses of alterative and purgative drugs (F. 171), small blisters behind the ears, or setons in the nape of the neck, may prove useful. On the contrary, where there is evidence of anæmia, where the nervous system has been overworked or insufficiently nourished, there the chloride of ammonium, cod-liver oil, chalybeates, plenty of animal food with wine or malt liquor, and change of air, must be prescribed. For those attacks of temporary dizziness to which the aged are liable, small doses of corrosive sublimate (F. 27) and bark are often valuable.

X. DISEASES OF THE SPINAL CORD.

Experiment and clinical observation have taught us that the spinal cord in connection with the brain is the instrument of sensation and voluntary motion to the trunk and extremities. The continuity of the cord with the encephalon is absolutely essential; for let it be destroyed, and then sensation and voluntary motion must necessarily be abolished in all those parts of the body supplied by spinal nerves below the seat of injury. The nearer the seat of interruption to the encephalon, the greater will be the paralysis, and the more rapidly will life be extinguished; so that if the cord be severed at its junction with the medulla oblongata (as when an animal is "pithed"), death will result immediately. To Dr. Marshall Hall, however, we are mainly indebted for proving that the spinal cord may be the instrument for the excitation of movements, *independently* of volition or sensation; either by the direct irritation of its substance, or through the influence of some stimulus carried to it from a portion of the trunk or extremities by nerves there distributed.

The spinal cord, surrounded by the dura mater and arachnoid and pia mater, occupies the superior two-thirds of the vertebral canal; its weight, when freed from the membranes and nerves, being about one ounce and a half. Above, opposite the upper border of the atlas, the cord ends in the medulla oblongata; while below, on a level with the intervertebral substance separating the first and second lumbar vertebræ, it terminates among the leash of nerves known as the cauda equina. Of a flattened cylindrical form, the cord is divided by an anterior and a posterior median fissure into two symmetrical portions; each of these divisions being so fissured that it consists of four columns—an anterior, a lateral, a posterior, and a posterior median. On making a transverse section of the cord we find it to consist of gray or vesicular, and white or tubular matter. The gray matter, made up of nerve filaments and countless corpuscular or multipolar cells, is placed in the interior of the cord, in the shape of two crescentic masses; each mass being in a lateral half of the cord, each having an anterior and posterior horn, and each being joined to the other by a band of matter called the gray commissure. The thirty-one pairs of nerves which issue from the cord have each two roots—an anterior purely motor, and a posterior purely sensitive; these roots, by their union, forming a compound nerve. From the labors of Schroeder Van der Kolk it seems certain that the anterior roots of the spinal nerves have their origin from the gray ganglionic cluster of cells of the anterior horn; the anterior medullary fibres of the cord being the channels through which the influence of the will is conveyed from the brain to these ganglionic clusters or plexuses. The posterior roots have two rootlets, one of which seems to ascend in the

white substance of the brain, thus forming the channel of sensation; while the other penetrates the white substance and appears to be lost in the ganglionic cells of the posterior horn and centre of the gray matter. These latter rootlets of the great posterior or sensitive roots are thought to consist of the filaments for reflex action. Thus it is said that the two horns of gray matter stand in the closest relation to motion; the anterior being the direct sources of motion, while the posterior serve for reflex action and co-ordination. (The cause of the co-ordination of movements is therefore situated in the spinal cord, and not in the cerebellum.) The medulla oblongata is believed to be the common central point where reflex action crosses to either side, and on the irritated state of which, general spasms—as convulsions and epilepsy—are thought by Van der Kolk to depend. The white or medullary matter consists of gelatinous nerve-substance and extremely minute nerve-filaments.

The structure of the medulla oblongata extends upwards through the pons Varolii to the crura cerebri; while below it is continuous with the spinal cord, of which indeed it may be said to be the superior enlarged portion. This pyramidal-shaped body is divided into two equal portions by an anterior and a posterior groove. Each lateral half thus produced is subdivided by minor grooves into four columns or eminences—the anterior pyramids, the lateral tract and olivary body, the restiform body, and the posterior pyramid. About one inch below the pons Varolii (the bond of union between the cerebrum, medulla oblongata, and cerebellum), if the anterior pyramids be separated from each other, it will be seen that the innermost fibres of these pyramids decussate with one another. Consequently, disease on one side of the brain manifests its effects on the opposite half of the body. With regard to the functions of the medulla oblongata, besides exhibiting the property of reflex action, and besides being the tract of communication between the brain and cord, it is a nervous centre of the greatest importance; since on the integrity of its structure depend both respiration and deglutition.

In the hope that these remarks will facilitate the comprehension of much that follows, I proceed to a consideration of the disease of the cord.

1. **SPINAL MENINGITIS.**—Acute inflammation of the membranes of the cord (sometimes termed *acute paralysis from inflammation of the membranes of the spinal cord*) is seldom met with. The disease terminates either in resolution, or in the effusion of serum, or in softening or suppuration. The morbid action, when acute, may be associated with disease of the cerebellum or of the cerebral membranes; while when chronic, it is mostly found associated with caries of the bodies of the vertebræ.

The *symptoms* which have been described as indicating inflammation of the meninges of the cord are very severe. Thus there is always high fever with sleeplessness. There are acute pains, often of a burning character extending along the spine and stretching into the limbs, aggravated by motion and pressure, and often simulating rheumatism. In one case which was under my care, the patient remained coiled up in the middle of the bed in a characteristic manner; dreading to move, and in fact declining to do so for some sixty hours: she would not even allow her position to be altered when the catheter was required, so severe had been the paroxysms of pain along the spine and limbs on any movement being attempted. As the disease continues we find rigidity or tetanic contraction of the muscles of the neck and back, varying in degree, but amounting sometimes to opisthotonos, with feebleness of the limbs. This feebleness does not prevent motion, if the patient will make an attempt to move. Where there is

much effusion we may detect paralysis of the lower extremities, the loss of power gradually extending upwards as the effused serum increases in quantity. When the disease gets fully developed there will be more or less difficulty of breathing, sometimes so severe during the paroxysms as to give rise to suffocating sensations; a feeling of constriction in the neck, back, and abdomen; retention of urine; occasionally priapism; and obstinate constipation, ofttimes succeeded by diarrhœa, with pale offensive stools. Great prostration sets in towards the close, while there may be feverish delirium and coma.

Males appear to suffer more often from spinal meningitis than females. The disease is most common between the second and seventh year, and then between the twentieth and twenty-fifth year; while exposure to wet and cold in rheumatic subjects seems to be its most frequent cause, mechanical injuries taking the second rank. The changes found after death are great congestion, chiefly confined to the pia mater; effusions between the arachnoid and pia mater of serum or pus, with perhaps softening of the cord. Lastly, the treatment of this for the most part fatal disease must be that recommended when speaking of inflammation generally. It has indeed been allowed by some who have resorted to bleeding and mercury, that success has not followed the use of these remedies, though they account for the failure on the ground of the practice not having been adopted with sufficient energy.*

2. MYELITIS.—Myelitis [*Μυελὸς* = marrow + terminal *-itis*], or inflammation of the substance of the spinal cord, is not marked by any very uniform set of symptoms. The features of the disease will be found to vary with the severity of the attack, its duration, and the portion of the cord affected.

Tracking the inflammation from above downwards the following are the chief *symptoms*: When the *cranial* portion is affected we find deep-seated headache, convulsive movements of the head and face, inarticulate speech, trismus, difficult deglutition, impeded spasmodic breathing, irregularity in the heart's action and in the pulse, with hemiplegia or other form of paralysis. As the fatal stage approaches there is great prostration, feeble circulation, increased dyspnœa, and involuntary escape of the excretions. Where the inflammation affects the whole thickness of the cord above the origin of the phrenic nerves, life is at once extinguished by the cessation of the action of respiration. Supposing the inflammation is in the *cervical* portion, the prominent signs will consist of difficulty of deglutition, impossibility of raising or supporting the head, acute pain in the back of the neck, great dyspnœa, a sense of pricking and formication in the arms and hands, together with paralysis of the upper extremities. In inflammation of the *dorsal* region there is pain in this district, numbness or pricking sensations in the fingers and toes, convulsive movements of the trunk, paralysis of the arms and lower extremities, short and laborious respiration, great palpitation, &c. When, as is most commonly the case, the *lumbar* portion is attacked, the paralysis of the lower extremities becomes more marked; there is great pain in the abdomen, with a sensation as of a cord tied tightly round it; there are convulsions or paralysis; while paralysis of the bladder and sphincter ani ensues, leading to retention, which is followed by incontinence of urine and involuntary stools.

The pain in the affected part of the cord is less severe than in menin-

* Diseases of the Spinal Cord and its Membranes. By Charles Evans Reeves, M.D., &c., p. 45. London, 1858.

gitis; it is increased by the application of heat (as of a sponge dipped in hot water), or by firm pressure. Care must be taken not to attribute the pain to lumbago. The loss of sensation in the palsied limbs is complete. Probably myelitis often coexists with pneumonia and gastro-enteritis.

The disease seems usually to be *excited* by cold and damp, or by wounds and contusions; while sometimes it occurs during the progress of fever. The *prognosis* is always grave; but there is no reason to doubt that many cases recover where the inflammation has only been of short duration, and especially where only the lower half of the cord has been affected. It may, however, terminate fatally in the acute stage, or afterwards from the occurrence of ramollissement or of suppuration. Ramollissement is the most frequent result, which cannot be distinguished from non-inflammatory softening by the naked eye. Sometimes one part of the cord is found softened, and another portion indurated. Occasionally an abscess has been discovered in the substance of the cord.

The *treatment* proper in inflammation of the cord and membranes is the same as that previously recommended for inflammation of the brain and its membranes. Better results may be hoped for from iodide of potassium than from any other drug. Where there is any suspicion that a syphilitic taint is at the root of the mischief, mercury ought to be given. Great care must be taken to keep the patient dry and clean, as well as to empty the bladder frequently with the catheter; remembering that incontinence of urine generally arises from the bladder being overdistended,—literally from the urine overflowing. Bed-sores will most likely be prevented by placing the patient on a water-bed; or in the absence of this, by the use of the soft amadou plaster.

3. SPINAL HEMORRHAGE.—Apoplexy of the spinal cord is more infrequent than cerebral hemorrhage. The paralytic and other effects are due to the effusion of blood into the spinal canal, or into the sac of the arachnoid, or into the substance of the cord.

The *causes* are chiefly blows and falls, overexertion, acute inflammation of the cord or membranes producing softening of the cord, fatty degeneration of the coats of the bloodvessels, and caries or other disease of the vertebræ. Remains of old apoplectic clots have been found external to the dura mater, or between the membranes, or in the substance of the cord—even in the medulla oblongata. Such signs of bygone hemorrhage and recovery are very uncommon. Where the effusion is abundant, death may ensue at once; but when this does not happen, a fatal result will perhaps take place after the lapse of some time owing to chronic softening of the cord.

The *symptoms* will depend upon the seat of the ruptured vessel. When the blood is effused between the membranes it will necessarily gravitate to the lowest part of the spinal canal, and hence will arise abrupt paraplegia, which gradually ascends. There will also be acute and sudden pain in the back, and sometimes in the head; severe convulsions often set in; the breathing will be difficult when there is pressure on the upper part of the cord; the heart's action is usually much depressed; the skin is pale and cold, but there is no loss of consciousness. Effusion into the substance of the cord produces sudden paralysis in all parts supplied with nerves below its seat; unless the hemorrhage be very slight, when the loss of power may occur slowly after the lapse of several hours.

The object of our *treatment* must be to check the effusion of blood by absolute quiet, and the application of ice along the spine.

4. TUMORS.—Paralysis may arise from the long-continued pressure of tumors upon the cord, producing partial atrophy. The morbid growth will consist either of tubercle, or cancer, or bone, or hydatid cysts, or aneurisms, or small syphilitic gummata. Exostosis of the odontoid process of the second cervical vertebra has occasionally been found. Sometimes the pseudo-tumor has had its origin in syphilitic caries of the vertebræ.

The *symptoms* come on very slowly, paralysis occasionally not being manifested until great pressure is exerted. The paralysis of motion always precedes that of sensation. There is usually a severe neuralgic kind of pain over the seat of the growth; while cramps, with convulsive movements of the extremities, are not uncommon. Malignant fungoid growths have been found on the dura mater. Where any kind of tumor is associated with scrofula or syphilis or cancer, there will be other manifestations of the particular affection.

The *treatment* must be chiefly constitutional; though occasionally counter-irritants to the painful part of the spine do good. Iodide of potassium, cod-liver oil, and a nourishing diet, are the remedies from which most good may be expected.

5. HYDRORACHIS AND SPINA BIFIDA.—Hydrorachis is a term applied to abnormal collections of fluid within the spinal column. When the fluid has been present for some time it produces, by its pressure, atrophy of the cord.

Hydrorachis is generally congenital, and associated with *spina bifida*. Where the latter is unaccompanied by hydrorachis, the deformity consists in absence of the spinous processes of the vertebræ; the vertebral arches being bent towards each other so as to leave only a very slight space between them. In the greater number of cases, however, the spinous processes and laminæ of some of the vertebræ are widely cleft or deficient. Consequently, the cord and its coverings being deprived of support, protrude and form a fluctuating tumor, varying in size from an orange to an adult head, the serous fluid which naturally lubricates the medulla and its membranes being secreted in excess. The tumor is generally covered with skin; under which is areolar tissue, and then dura mater. If the child live, the dura mater becomes thicker and harder as age advances. "The connection," says Mr. Prescott Hewett, "which generally exists between the cord or the nerves and the walls of the sac, is a point of the utmost importance. Some cases are related, by various authors, in which neither the cord nor the nerves had any connection with the sac; these parts followed their usual course down the spinal canal, but in by far the greater number of cases that have been placed upon record, the nerves presented some kind of connection with the sac. Of *twenty* preparations of spina bifida occupying the lumbo-sacral region, which I have examined in various collections, I have found but *one* in which the nerves were not connected with the sac. If the tumor corresponds to the two or three upper lumbar vertebræ only, the cord itself rarely deviates from its course, and the posterior spinal nerves are generally the only branches which have any connection with the sac. But if the tumor occupies partly the lumbar and partly the sacral region, then generally the cord itself and its nerves will be found intimately connected with the sac. M. Cruveilhier believes, from his dissections, that this connection is constant."*

Before birth, spina bifida does not seem to affect the fœtal health; while

* Remarks on Cases of Spina Bifida, by Prescott Hewett. Medical Gazette, vol. xxxiv. London, 1845.

fterwards, the noxious effects vary with the seat of the tumor, and its ontents. When the cleft is in the cervical portion, it is generally fatal a ew days after birth: it is the least dangerous when seated in the lumbar nd sacral regions, some few individuals having lived with it for twenty or hirty years, or even for the natural term of life. If complicated with ydrocephalus, the prognosis is very unfavorable; and such is also the ase when there is paralysis of the lower extremities, or when the tumor ontinues to enlarge, or when its walls enlarge and burst. There is frequently, moreover, great irritation and discomfort from excoriations about he perineum and thighs, produced by an inability to retain the urine. The sphincter ani is generally weak. This malformation is said by Chaussier (whose opportunities for observation at the Paris Maternité have been large) to be met with about once in every thousand births.

As a general rule, the less the tumor is interfered with the better, all operations being attended with danger. In those cases, however, where the fluid contents are rapidly increasing in quantity, it is certainly justifiable to try the effects of puncture, followed by compression. Two rules laid down by Mr. Hewett must be observed: 1. The tumor should never be punctured along the mesial line, especially in the sacral region, for it is generally at this point that the cord and its nerves are connected with the sac. The puncture is to be made at one side of the sac, and at its lowest part, so as to diminish the risk of wounding any of the nervous branches. 2. The instrument ought to be a needle or a small trocar; for if a lancet is used there will be a greater risk of wounding some important structure contained in the tumor. Compression by air-pads and bandages ought to be resorted to after evacuating the fluid. The most remarkable example of this practice I have seen, is the following: On the 21st March, 1860, I tapped the tumor of a little girl four years of age, removing eight ounces of a clear limpid fluid. A cleft was distinctly felt in the sacral vertebræ. In spite of pressure, the cyst refilled and appeared to be as large as ever two days after the operation. Nevertheless, the child is still living (1869), and in the enjoyment of tolerable health.

Iodine injections have been proposed and practiced by M. Chassaignac, and in one case at least with apparent success. More evidence, however, is required of the safety and utility of this mode of treatment before its adoption can be recommended. Cases are also said to have been cured by pressure alone,—even by such an amount as can be produced with collodion!

In all instances attention should be paid to the general health. The diet ought to be nutritious; while in the case of an infant at the breast, great care must be taken that the nurse is strong and healthy. If residence at the seaside can be obtained, so much the better.

6. **CONCUSSION.**—It is rather remarkable, that while considerable attention has been paid to the subject of concussion of the brain, very little notice has been bestowed upon the same condition as it affects the spinal marrow. The little knowledge which I possess on this matter will perhaps be best conveyed to the reader, by a concise reference to two well-marked cases of concussion of the cord which came under my notice during the year 1860. In one case the lady fell while walking upon some rocks on the Devonshire coast; in the other a jump from a high phaeton was the cause of the accident. Neither lost consciousness in the slightest degree, both felt the peculiar tingling in the hands and feet called pins and needles, and both were able to walk some little distance after the shock. The first patient did not apply to me till six weeks after the fall; when she com-

plained of nervousness and general weakness, some difficulty in passing urine, a sense of cold and deadness in the legs, startings at night, with a steadily increasing difficulty in walking. Perfect rest in bed for one month, with the daily application of the extract of belladonna down the course of the spine, effected a cure.

The second patient consulted me on the day following the mischief, inasmuch as she was frightened because she felt so sore and bruised that she could scarcely move. There was, however, no real paralysis. The bladder was unaffected. The pain was correctly attributed to the jump, though surprise was expressed at the severe result, inasmuch as she alighted safely upon her feet. She was kept in bed for many days until every symptom had vanished; and no ill consequence ensued on her afterwards walking about.

Where cases like the foregoing are neglected, and when the sufferers continue to take exercise, there is a fear of degeneration and softening of the marrow setting in; which conditions are very likely to end in more or less extensive incurable paralysis, or even in general muscular atrophy and death. Mr. Hilton, in his lectures at the Royal College of Surgeons during 1860, mentioned the case of a gentleman who had had a fall upon his back, a few years previously, owing to the giving way of some scaffolding. Directly he fell he experienced the sensation of pins and needles in his legs. Having been told when a boy, that in the event of an accident of this description the best plan was to "run it off," he immediately started away and quickly walked six miles. Within a very short time he began to experience spinal-marrow symptoms, which have resulted in complete and irremediable paraplegia. Mr. Hilton stated his belief, that if the man had gone home directly after receiving the injury, and had kept himself quiet for a considerable period, he would have been quite well in a few weeks.

One more example will complete all that need be said on this subject. The particulars of the case are as follows: A stout but feeble man, between sixty and seventy years of age, trod on a piece of orange-peel and fell, the lower part of his sacrum striking the pavement with great force. He was taken in an insensible condition to Charing Cross Hospital, where he soon recovered his mental faculties; but both his upper and lower extremities were motionless. On the fourth day he was conveyed home and was seen by Dr. C. E. Reeves, when it was noted that his voice was weak and interrupted, his breathing slow, the heart's action weak, the urine scanty, and the extremities motionless and insensible. Galvanism and stimulating embrocations were tried, but the patient was found dead in his bed on the twelfth morning. At the necropsy, the cord was discovered of a bluish tinge, and pulpy to the touch, while the brain presented a similar but less marked appearance. The heart and large bloodvessels, moreover, contained fibrinous clots.

7. SPINAL IRRITATION.—The existence of spinal irritation as a distinct and idiopathic disease has been denied by some writers, and it is my duty to confess that the greater the attention which I have bestowed upon this subject, the more inclined I am to believe that there is no affection deserving the name.

In the second and third editions of this volume the symptoms of spinal irritation were said to consist of pain about the thorax, mammæ, abdomen, or uterus; this pain having some remarkable connection with the spine, since, wherever the suffering might be, it was increased on pressing certain of the spinous processes of the vertebræ, which were also

themselves exceedingly tender. Moreover, this tenderness was sometimes confined to one spot, sometimes diffused over a large portion of the spinal column, while it was most common in the lumbar and sacral regions. The disease would seem to depend (it was observed) upon congestion of the spinal venous plexus; this hyperæmic condition causing pressure upon, and consequent irritation of, the origins of the nerves.

Owing to doubts which I have for some time entertained, I have scrupulously availed myself of every opportunity, during the last nine years, to carefully examine examples of so-called "Spinal Irritation," or "Spinal Disorder;" and the result has been this—that in every instance the suffering has appeared to be due to a combination of myalgia and hysteria, with constitutional debility. The history has always shown that the patients, almost without exception, were delicate women, and that prior to the illness for which relief was sought, they had undergone great fatigue, or had been living badly, or had indulged in excessive sexual excitement, or had long suffered from a copious leucorrhœal or menstrual discharge. Frequently, they have retroflexion of the uterus. Moreover, the seat of the pains has usually corresponded with the insertions of important muscles; there has been a marked freedom from suffering so long as the recumbent posture has been maintained, and more or less well-marked symptoms of hysteria have coexisted.

The *treatment* of these cases has served to confirm the statements just made; for under the influence of rest, belladonna plasters, nourishing food, cod-liver oil, bark or steel, and attention to the position and functions of the uterus, many cures have been effected with comparative ease. To prevent any misunderstanding, it must be mentioned that, with regard to rest, I merely mean that for a few weeks the patient shall retire to bed at nine or ten o'clock at night, and remain there until about the same hour the following morning, and not that she shall be confined to the recumbent posture for several months together. A short time since I saw a delicate young lady who, under the advice of an irregular practitioner, had actually kept her bed for five years; but who, I believe, might have been cured of her pseudo-spinal disorder in as many weeks by confidence in a physician who knew his business, sea air, moderate exercise, and a nourishing diet.

XI. PARALYSIS.

By paralysis [*Παραλύω* = to relax—to affect with paralysis], or palsy, is meant a total or partial loss of sensibility or motion, or of both, in one or more parts of the body. All paralytic affections may be divided into two classes. The first division includes those in which both motion and sensibility are affected; the second, those in which the one or the other only is lost or diminished. The former is called *perfect*, the later *imperfect* paralysis. Imperfect paralysis is divided into *acinesia* [*Ἀ* = priv. + *κίνησις* = motion], paralysis of motion, and *anæsthesia* [*Ἀ* = priv. + *αἰσθάνομαι* = to perceive by the senses, to feel], paralysis of sensibility. Again, the paralysis may be *general* or *partial*, as it affects the whole body or only a portion of it. Partial paralysis is arranged into *hemiplegia* [*Ἡμισυς* = half + *πλήσσω* = to strike], when it is limited to one side, and *paraplegia* [*Παραπληξία* = partial paralysis; from *Παραπλήσσω* = to strike badly], when it is confined to the inferior half of the body.

The term *local paralysis* is used when only a small portion of the body is affected: as the face, a limb, a foot, &c. In *reflex paralysis* [*Reflecto* = to turn back] the irritation extends from the periphery to the centre. Diseases of the urinary organs, uterus, and intestines, are the most common causes of this form. And then there is that peculiar disease known as *progressive muscular atrophy* or *wasting palsy*, the prominent symptom of which is a remarkable degeneration and wasting of the disabled muscles.

Paralysis of the eye, or loss of sensibility of the retina to the rays of light, is called *amaurosis* [Ἀμαυρόω = to obscure]; paralysis of the levator palpebræ superioris muscle, allowing the upper eyelid to fall over the eye, *ptosis palpebræ* [Πτόω = to fall]; insensibility to the impression of sounds, or deafness, *cophosis* [Κωφὸς = deaf]; insensibility to odors, or loss of smell, *anosmia* [Ἀ = priv. + ὄζω = to smell]; while loss of taste is technically known as *ageustia* [Ἀ = priv. + γεῦσις = the act of tasting].

Locomotor ataxy can scarcely be correctly classed with paralytic diseases strictly so called. It is more properly a disease of the posterior columns of the spinal cord, producing a loss of the power of co-ordinating movements. Still there are advantages in treating of this affection in the present section. The disease was formerly described under the name of *Tabes dorsalis*, and was erroneously believed to be always the result of exhaustion from masturbation. In extreme cases, this pernicious habit leads to a wasting of the spinal cord; but this wasting can also be produced by other causes. With regard to masturbation it may be remembered that a frequent cause of self-abuse in boys is the irritation produced by sebaceous matter lodging between the glans penis and prepuce; under which circumstance the operation of circumcision proves very valuable. Women suffer less frequently from the evil consequences of bad habits than young men. Many instances of so-called "spinal irritation" are, however, due to them; while they probably have a considerable influence in the causation of hysteria and other nervous affections.

In *hysterical paralysis* there is probably neither organic disease of the nervous centres nor of the motor nerves. It occurs in hysterical women; and is produced by fright, overexcitement, ovarian irritation, &c. The paralysis may affect the muscles of both lower extremities (hysterical paraplegia); or the muscles of the arm and leg on the same side (hysterical hemiplegia); or only one or two particular muscles will be attacked. There are generally, but not always, other symptoms of hysteria. Many cases get well by recourse to remedies which improve the general health; but frequently electricity will effect a more speedy cure.

In *rheumatic paralysis* the lower extremities are often affected, or the extensor muscles of the forearm, or the deltoid and trapezius, causing a difficulty in raising the arm. It comes on suddenly or gradually, with pain or numbness, and it is curable. Sometimes, at least, the palsy is connected with rheumatic spinal meningitis.

The peculiar feature of *diphtheritic paralysis* is the manner in which it comes on just as the physician is congratulating himself that the patient is convalescent. The greater number of cases recover. All this, however, will be mentioned by and by.

Then there are, likewise, certain forms of paralysis induced by the use of metallic poisons, as *mercurial palsy* or *tremors*, and *saturnine* or *lead palsy*; there is the rare affection termed *scrivener's palsy*; and, lastly, there is that very peculiar affection known as *paralysis agitans*, readily recognized by the incessant trembling, &c.

To conclude this summary, before proceeding to the consideration of each

form of paralysis in detail, it must be added that the palsy in the foregoing instances may be due either to disease of the brain arising from apoplexy, abscess, softening, induration, tubercular or cancerous or syphilitic or aneurismal tumors, epilepsy, or chorea; to disease of the spinal cord, such as inflammation, atrophy, solution of continuity, &c.; to diseases of the investing parts of the brain or cord, acting by the pressure they produce; to simple lesion or compression of a nerve, by which its conducting power is impaired; to the effects of diphtheria, hysteria, or rheumatism; or to the influence of such poisons as lead, mercury, &c.

1. **GENERAL PARALYSIS.**—General paralysis, or complete loss of sensation and motion of the whole system, cannot take place without death immediately resulting. This term therefore is only applied to palsy affecting the four extremities, whether any of the other parts of the body are implicated or not. In most cases the loss of motion is more marked than that of sensibility; the intelligence also soon becomes affected. It must not be confounded with the general paralysis of the insane.

Dr. Defermon* has related a remarkable case in which the power of motion in every part of the body was lost, with the exception of the muscular apparatus of the tongue, and that of the organs of deglutition and respiration. The sensibility was also wholly destroyed, barring that of a small patch on the right cheek, by tracing letters on which the patient's friends were enabled to communicate with him; while the intellect was perfect.

2. **HEMIPLEGIA.**—This term is used to denote paralysis of one side, extending almost invariably to both the upper and lower extremities. It is most times the result of a fit of apoplexy.

Hemiplegia is the most common form of palsy. It is usually spoken of as "a paralytic stroke;" and the left is affected more frequently than the right side. When only one extremity suffers, it is generally the arm. Very rarely the upper limb of one side and the lower of the opposite are paralyzed, forming what is termed *transverse* or *crossed palsy*. Generally, the facial nerve or portio dura of the seventh pair is not involved in the paralyzing lesion; but the fifth nerve is affected, so that the palsied cheek drops loosely, while the angle of the mouth is drawn slightly upwards and to the sound side, clearly because the muscles on that side are no longer counteracted and balanced by the corresponding muscles of the paralyzed side. The tongue also is often implicated; so that when protruded, its point is turned toward the palsied side. This is owing to the muscles which protrude this organ being powerless on the diseased side, while they are in full vigor on the other; so that the sound half of the tongue is pushed out further than the other half, and consequently it bends towards the affected side. The articulation is imperfect, in consequence of the palsy of the ninth and fifth nerves. And then if the third nerve be involved, the upper eyelid will drop, there will be a dilated pupil, and a divergent squint.

The paralysis in hemiplegia is always limited to one half of the body, the median line being the boundary. In most cases there is anæsthesia. The mental faculties are sometimes uninjured, but more frequently they are irreparably damaged. The memory especially becomes weakened; while at the same time there is a peculiar tendency to shed tears, and to be much distressed by slight causes.

The effect of paralytic disorders upon the memory is often very remarkable. In hemiplegia of the right side there is sometimes a curious forget-

* Bulletin des Sciences Médicales, tome xiii, p. 6. Paris, 1828.

fulness and misplacement of language, so that the sufferer cannot find words to express his ideas, or he substitutes expressions having no relation with the sense intended. Sir Henry Holland refers to a case of slight paralytic affection, in which the perceptions from the senses were unimpaired, the memory of persons and events seemingly correct, the intelligence only slightly affected, the bodily functions feeble but not disordered, and yet the memory of words for speech so nearly gone that the single monosyllable "yes" alone remained as the sole utterance of all the patient desired to express. Even when a simple negative was intended, no other word was used. These cases of cerebral speechlessness have already been treated of under the head of *aphasia* (see p. 318).

In paralysis from red softening of the brain, the muscles of one of the affected limbs are sometimes rigid and contracted; owing to irritation of that part of the cord from which the nerves of the paralyzed member arise, by the propagation to it of excitement from the diseased portion of the brain.

Supposing recovery to take place, the symptoms of amendment are first noticed in the leg. In hopeless cases, the limbs waste; their nutrition and temperature get diminished; and they become atrophied. It is of practical importance that they are unable to resist the influence of cold or heat equally with the sound parts.

Hemiplegia is generally the result of organic lesions of the brain; while most frequently perhaps the lesion is in the corpus striatum and the optic thalamus. An apoplectic seizure is the cause of sudden and perfect hemiplegia in the great majority of cases. Where the palsy comes on gradually and slowly, then the cerebral lesion is of the nature of softening (possibly the result of obstruction of the middle cerebral artery by a clot), or of a tumor, or of a syphilitic gummatous growth, or of an abscess, or a hydatid cyst, &c. When the intelligence and memory are affected, we may be sure that the convolutions of the cerebral hemispheres are involved, either directly in the lesion, or indirectly by pressure upon them. It must be remembered that the disease is not, as a rule, found on the side of the brain corresponding to the affected half of the body, but on the opposite: the cerebral portion of the centre of volition for the left side of the body being situated on the right side, and *vice versâ*. The decussation of the fibres of the anterior pyramids at the junction of the medulla oblongata and medulla spinalis, accounts for this phenomenon. This form of paralysis may also be due to some lesion of one-half of the spinal cord, just below the decussation of the pyramids; and then the palsy will be on the same side as the disease. Hence the term hemiplegia may signify *cerebral* paralysis, or *spinal* paralysis (very uncommon). So also the hemiplegia may be transient and caused by a fit of epilepsy; or it can happen in connection with pregnancy; or it may follow chorea, and pass away; or it may be due to some distant irritation (reflex hemiplegia), such as a colon loaded with unhealthy fæces, or persistent dyspepsia, in which the disease creeps from the periphery to the centre; or, lastly, an imperfect form will temporarily occur in some nervous women—hysterical hemiplegia, which may be diagnosed by the way in which they drag the limb while walking without attempting to lift it, whereas in true hemiplegia the patient drags the leg at the same time that he lifts it from the ground. In all forms the paralysis of motion is the prominent symptom; but sensation is sometimes more or less impaired.

In hemiplegia from disease of the brain, although the sufferer cannot by his own will move the palsied limb, yet irritation of the sole of the foot (as with a feather) will excite active movements; these reflex actions often

causing no little astonishment to the patient. To distinguish between cerebral and spinal paralysis is not easy. According to Marshall Hall the condition of the irritability or contractility of the muscular fibre in the paralytic limbs must be our guide in diagnosis: since,—(1.) In pure cerebral paralysis, or that in which the influence of the cerebrum alone is removed, there is augmented irritability and reflex action. (2.) In spinal paralysis, or that in which the influence of the spinal marrow is also removed, there is diminished irritability and reflex action. The galvanic current is the test of the amount of irritability.* Dr. Todd, however, denied the correctness of these views, and asserted that the contractility or irritability of the muscles of paralyzed limbs bears a direct relation to their nutrition; that the excitability of the paralyzed muscles to galvanism varies with the condition of their nerves, more than with that of the muscles themselves; that, in the majority of cases of cerebral palsy, the contractility or irritability of the paralyzed muscles is less than those of the sound side, simply because their nutrition is impaired by want of exercise; and lastly, that no diagnostic mark to distinguish between cerebral and spinal palsy can be based on any difference in the irritability of the paralyzed muscles, for the muscles in spinal paralysis exhibit the same states as those in cerebral paralysis.†

Dr. Althaus has tested the muscular irritability in nineteen cases of cerebral paralysis, and has arrived at the same conclusions as Dr. Todd. The former gentleman found that in a certain number of cases the contractility was diminished, the muscles were flaccid, and the polarity of the nerves depressed. In another class the contractility was increased, there was early rigidity of the muscles, and an irritative lesion of the brain. While in a third set of cases there was no difference between the contractility of the healthy and the paralytic limb. Dr. Althaus employed both modes of experimentation, viz., sending the current through the limb, and localizing the current in the tissue of the muscles. The two methods yielded nearly the same results; but by localizing the electric current in the muscles, the difference of muscular contractility appeared more striking. This gentleman's conclusions, which seem to have been carefully deduced and therefore to be trustworthy, are these: The muscles of paralyzed limbs may present three different conditions when subjected to the action of the electric current, and this may enable us in certain cases to diagnose the paralyzing lesion. "1. If the excitability of the muscles, or rather the polarity of the motor nerves, be *increased* in the paralyzed limbs, the case is one of *cerebral paralysis*, connected with an irritative lesion within the cranium. 2. If the excitability of the muscles be nearly or totally *lost*, we have in all probability either *lead palsy* or *traumatic paralysis;* but it must be kept in mind that certain hysterical and rheumatic palsies of long standing present the same peculiarity; and that it also may be found in cases of disease of the brain and the cord. 3. If *paralyzed muscles respond readily to the electric current*, there is no lead in the system, nor is the connection between the motor nerves of the paralyzed muscles and the cord interrupted; but if such cases are of *long standing*, they are due to *brain diseases;* and if they are of *recent standing*, they are generally instances of *hysterical, rheumatic*, or *spontaneous* paralysis."‡

In the *treatment* of hemiplegia, even when seen early, it must not be forgotten that the mischief is done; and we cannot remedy the evil by taking

* Medico-Chirurgical Transactions, vol. xxii, p. 191. London, 1839.
† Idem, vol. xxx, p. 227. London, 1847.
‡ A Treatise on Medical Electricity, pp. 230 and 246. London, 1859.

away blood. Indeed, the patient will require all the power which he possesses to enable him to recover from the shock which his system had received; and hence depletion can only do harm. Benefit may, however, be very frequently and reasonably expected from cathartics; particularly such as jalap and scammony, or calomel, or croton oil, or stimulating purgative enemata. Some authors recommend blisters to the scalp, or to the nape of the neck, or the use of a seton. In all cases the practitioner should flex the forearm upon the arm, and the leg upon the thigh; taking care to observe if any of the muscles offer resistance to these movements. Where the muscles of the palsied limb are perfectly flaccid, we may feel satisfied that the cerebral lesion is of an atrophic nature; probably white softening due to defective supply of blood; and consequently that wine and nourishment, cod-liver oil, ammonia and bark, are needed. On the contrary, when there is resistance, the brain lesion is of an irritative kind, such as may be produced by an apoplectic clot which has lacerated or ploughed up the nervous substance in its vicinity; and then purgatives, blisters, and iodide of potassium will be called for. With respect to reflex hemiplegia, the cause must be ascertained; and then, if possible, removed.

When the paralysis becomes chronic, stimulants, especially such as act on the paralyzed parts, are to be had recourse to. Strychnia in small doses (the twentieth or thirtieth part of a grain thrice daily) should be cautiously tried; always provided we can reasonably hope that there is no disease of the brain, nor the remains of any blood-clot which may be easily excited into an irritating foreign body. And again, local stimulants had better be employed. Thus frictions with the hand or flesh-brush, as well as stimulating liniments of turpentine, ammonia, tincture of cantharides, croton oil, &c., have been used with occasional benefit.

Electricity and galvanism have long been extensively employed; but when there is any structural disorganization they do harm. Thus, they aggravate the mischief in cases of cerebral hemorrhage, in softening and atrophy of the cerebral substance, in pressure from tumors, and in paralysis due to disease of the spinal cord. But after reparation of the mischief (as by complete absorption of the clot, the nervous substance being left uninjured), when paralysis remains without any muscular rigidity, galvanism will do good. It is also useful in hysterical, rheumatic, and lead palsy; as well as in reflex paralysis from disease of the urinary organs, in diphtheria, fever, &c. Moreover, in cases of mal-nutrition and atrophy of muscular tissue it acts well, by augmenting chemical changes in the muscles and increasing therefore the supply of blood to them. Induction currents are to be used, so as to excite the vitality of the motor nerves; the continuous current proving useless in the cases under consideration. Opinions differ widely as to the *direction* in which the induced current should be sent through the paralyzed limb. Naturally the course of nervous influence is from the trunk towards the extremities, and hence it has been argued that the induced electric current should be made to travel through the nerves in the same direction, in other words the *direct* current is to be used, and not the *inverse*. But this view is not borne out in practice; and the inverse current is generally employed, because it excites stronger contractions in the muscles than the direct. At first a gentle current is to be applied, the intensity being gradually increased; while as a rule the administration should not last for more than fifteen minutes at a time, even if for so long a time.

3. PARAPLEGIA.—Paraplegia, or paralysis of the inferior half of the body, arises from organic or functional disease of the spinal cord or its

membranes. It most frequently commences slowly and insidiously, with weakness and numbness of the feet and legs, or with tingling and formication of these parts, unattended by pain. By degrees the weakness increases, until there is complete loss of sensibility and motion of the lower extremities, with paralysis of the coats of the bladder and the sphincter ani. The patient is obliged to remain in the horizontal posture; while from imperfect nutrition and pressure sloughs form on the hips and sacrum, which by their irritation and exhausting discharges accelerate death. If the urine be allowed to collect in the bladder in any quantity, it will soon get ropy, fetid, and alkaline, owing probably to the coats of the bladder becoming diseased and pouring forth unhealthy mucus in consequence of the paralysis. Dr. Bence Jones has remarked, that the urine when secreted is healthy; but admixture with the diseased mucus contaminates it, decomposes its urea, and gives rise to the formation of carbonate of ammonia, thus rendering it alkaline.

Although voluntary motion is completely abolished in the lower limbs, involuntary movements and spasms of the muscles are not uncommon. Patients are thus often tormented and rendered sleepless at night by involuntary startings of the lower extremities. The cause of this is to be found in some exacerbation of the primary disease in the spinal marrow, the excitement being propagated upwards to that portion of the cord in contact with the brain, as well as downwards below the lesion. Reflex movements can be excited much more frequently in paraplegia than in hemiplegia.

Paraplegia may happen from various injuries of the spinal cord or its membranes; from inflammation, congestion, or hemorrhage; from non-inflammatory softening, from the pressure of tumors, and also from affections of the bones and cartilages of the vertebral column. Most authorities now clearly distinguish two classes or kinds of paraplegia, viz., that which is due to disease of the spinal cord or its membranes, and *reflex* paraplegia, *i. e.*, that produced by an excitation which has reached the spinal cord from a sensitive nerve. In these latter cases Dr. Brown-Séquard believes that the palsy is accompanied, and perhaps produced by an insufficient amount of blood in the spinal cord. With such the irritation may have its starting-point either in the viscera, the skin, the mucous membranes, or the trunks of nerves; while no direct treatment of the paralysis is of use, so long as the cause of irritation remains. Moreover, in reflex paraplegia there is an absence of the special symptoms of organic disease of the spinal column or its contents; while the paralysis of the lower limbs is incomplete, and comes on gradually after the existence of disease in the urinary or genital organs, or in the thoracic or abdominal viscera, &c.

As regards the *treatment* of paraplegia we have first to decide whether there is any congestion or inflammation of the spinal cord or its membranes, or simply the very opposite condition. Dr. Brown-Séquard shows that when the amount of blood is increased (*e. g.*, in chronic local myelitis), we find symptoms of irritation of motor nerve-fibres, such as convulsions, cramps, twitchings, erection of penis; indications of irritation of sensitive nerve-fibres, as itching, pricking pains, abnormal sensations of cold or heat, &c., together with signals of irritation of vaso-motor or nutritive nerve-fibres, such as wasting of muscles, bed-sores, alkaline urine, and so on. There is pain corresponding with the upper limit of the inflammation, with tenderness on pressure at the same part. The application of a sponge, dipped in warm water, along the spine, causes a natural sense of heat in all parts above the seat of inflammation, but a burning sensation at its upper limit; while the passage of a piece of ice over the vertebral column pro-

duces a sense of cold everywhere except at the level of the inflammation, at which part a feeling of heat is experienced. In attempting to cure these cases our object must be to diminish the quantity of blood sent to the spinal cord; and for this purpose it seems no agents are so efficacious as the ergot of rye and belladonna, since they both produce contraction of the vessels of the cord and its membranes. The ergot should therefore be given in five- or six-grain doses twice a day, while a large belladonna plaster is to be applied over the spine. If no benefit ensue in the course of a few weeks, the iodide of potassium must be given in conjunction with the other medicines. Cod-liver oil can also be often beneficially added to the treatment. If there be much restlessness, henbane, or conium, or Indian hemp had better be exhibited; but opium is to be avoided, since it produces congestion of the cord. The diet should be generous, beer or wine often being needed. The nutrition of the limbs is to be maintained by the use of stimulating liniments or by shampooing, and subsequently by having recourse to a gentle galvanic current.

For paraplegia due to diminished nutrition of the cord (as that caused by white or non-inflammatory softening and reflex paraplegia) a directly opposite course is to be pursued. Consequently, where we find no signs of irritation or congestion, or of increase in the vital properties of the cord, we endeavor to give such food and remedies as will improve the quality of the blood, will cause an increased quantity of it to be sent to the cord, and will augment the vital properties of this nervous centre. Strychnine is here the remedy; one-twentieth of a grain being given daily, or one-thirtieth of a grain if combined with opium. Sulphur baths may also be used; quinine and iron will occasionally do good, and the patient when in bed should lie on his back, with his head and shoulders and lower extremities elevated, so that the blood may gravitate to the vessels of the cord.

Dr. John Chapman claims to have discovered that a controlling power over the circulation of the blood in the brain, in the spinal cord, in the ganglia of the sympathetic, and through the agency of these nervous centres in every other organ of the body, can be exercised by means of cold and heat applied to different parts of the back. In this manner the reflex excitability, or excito-motor power of the spinal cord, and the contractile force of the arteries in all parts of the body, can be immediately modified. In order to lessen the excito-motor power of the cord only, he applies ice, in an India-rubber bag about two inches wide, along that part of the spinal column on which he wishes to act. On the same principle, the vitality of the cord may be increased by applying hot water and ice alternately, each in a proper bag, where very energetic action is required; but if less vigorous effects are alone necessary, he uses ice or iced water only, resorting to it several times a day, for a short time on each occasion, with a long interval between each application. Thus, for example, intending to direct a fuller and more equable flow of blood to the brain, he applies ice to the back of the neck and between the scapulæ; increased circulation in, and warmth of, the upper extremities will be induced in the same way; the thoracic and abdominal viscera can be influenced in like manner by applications to the dorsal and lumbar regions, while the legs and coldest feet may have their circulation so increased that they become thoroughly warm by the ice-bag applied over the lower part of the back.*

It need only be further added, that while in reflex paralysis we endeavor by the foregoing plans to relieve the palsy, we must also try to remove its exciting cause; as by the expulsion of intestinal worms, relieving irrita-

* The Medical Times and Gazette, p. 60. London, July 18th, 1863.

bility of the urinary or sexual system, and curing all skin diseases, &c. In reflex paraplegia from onanism, the penis should be painted every night with the tincture of iodine, so as to make it too sore to allow its being handled. If this prove insufficient, blistering fluid may be used so as to produce a raw surface. Where there is irritation from the retention of sebaceous matter between the glans penis and the prepuce, the latter should be cut off. The cold douche will also be useful in these cases.

4. LOCOMOTOR ATAXY.—The symptoms and pathology of this remarkable disease have been worked out by different authorities. In the first place, Romberg, the eminent Professor of Medicine at the University of Berlin, described the prominent features of the disorder under the very old name of *tabes dorsalis*. Then Dr. R. B. Todd, after teaching in his hospital wards the features distinguishing this affection from ordinary paraplegia, published some remarks upon it about the year 1847;* these observations, though brief, really containing the pith of the matter. Subsequently, in 1858, Dr. Duchenne's first memoir on this subject appeared, and to him we are indebted for an excellent clinical study of it. He also selected the name of progressive locomotor ataxy (*ataxie locomotrice progressive*), by which it has been subsequently recognized. And finally, Mr. Lockhart Clarke has shown the nature of the peculiar change which takes place in the posterior columns of the spinal cord, as well as in the posterior nerve-roots.

Locomotor ataxy [from Ἀ = priv. + τάσσω = to place or order], is characterized by such a diminution of the power of co-ordinating the action of the muscles required for the performance of certain movements, that those movements cannot be made steadily in response to the will. As a rule, the abolition of this faculty of co-ordination commences in the lower extremities, so that locomotion is accomplished in a disorderly manner, with an uncertain or staggering gait. There is no true paralysis, but the sensibility of different textures becomes more or less impaired. Neuralgic pains in the legs and feet are among the most constant phenomena presented. Moreover, the loss of power is progressive; a fact, however, which can be recollected without prefixing this hopeless word to the disease as it stands in our nomenclature.

Very little information can be given with regard to the *etiology* of this disease. Summarily, it may be said that males suffer much more than females; while the former are most liable to it between the ages of thirty and fifty. Hereditary predisposition to diseases of the nervous system has an undoubted influence. The causes mostly assigned, however, are prolonged exposure to cold and damp, insufficient food, drunkenness, over-

* "Two kinds of paralysis of motion," says Dr. Todd, "may be noticed in the lower extremities, the one consisting simply in the impairment or loss of the voluntary motion, the other distinguished by a diminution or total loss of the power of co-ordinating movements. In the latter form, while considerable voluntary power remains, the patient finds great difficulty in walking, and his gait is so tottering and uncertain that his centre of gravity is easily displaced. These cases are generally of the most chronic kind, and many of them go on from day to day without any increase of the disease or improvement of their condition. In two examples of this variety of paralysis I ventured to predict disease of the posterior columns, the diagnosis being founded upon the views of their functions which I now advocate, and this was found to exist on a post-mortem inspection; and in looking through the accounts of recorded cases in which the posterior columns were the seat of lesion, all seemed to have commenced by evincing more or less disturbance of the locomotive powers, sensation being affected only when the morbid change of structure extended to, and more or less involved the posterior roots of the spinal nerves."—The Cyclopædia of Anatomy and Physiology, vol. iii, p. 721 B. London, 1839–1847.

fatigue, sexual excesses — especially masturbation, and possibly mental anxiety acting on a weak frame for a long period. Some patients have attributed it to operations for the cure of hæmorrhoids; but seeing that whatever depresses nervous force will have some influence in producing ataxy, it is not unlikely that the loss of blood which accompanied the piles before the surgeon was consulted had much more to do with the subsequent mischief than the operation. Rheumatism, gout, syphilis, and gonorrhœa have severally been blamed; but in all probability without sufficient reason.

The *symptoms* of this chronic disease have been usually divided into three stages. If the arrangement is arbitrary, it is convenient. In the first stage, there is usually a temporary loss of power in one of the motor nerves of the eye, disordered vision, paroxysms of neuralgic pain, and spermatorrhœa or impotence. After an interval varying from a few months to some years, the second stage sets in; being characterized by a difficulty in standing or walking with steadiness, diminution of sensibility, constipation, and probably some trouble in retaining the urine—especially at night. Then follows the third stage, which is marked by the symptoms of the two preceding divisions becoming more marked and painful. The loss of power often becomes more general, though it continues most apparent in the legs and feet; and death happens from exhaustion, or from the occurrence of some complication.

The difficulty of co-ordinating the movements usually begins in the lower extremities, and makes the greatest progress in them. After a time, the hands and arms may get affected; while one case has been reported where these limbs were alone attacked during the whole course of the disease. The unsteadiness of gait is peculiar. The patient starts off nervously and hurriedly, and then walks like a drunken man; but as soon as a little confidence has been acquired he shows less fear of losing his balance, and his gait gets less tottering. A stick, or the arm of a friend, proves a grateful support to him. He fixes his eyes on surrounding objects at first; but in a later stage watches his feet, and tries to assure himself by his sight that they are firmly planted on the ground. If the upper extremities are unsteady, there is a similar difficulty in carrying out the mandates of the will. To pick up anything, for example, the patient is obliged to use both hands —one being employed to steady the other. As the disorder progresses, the movements of the limbs become more and more uncertain. The legs are jerked forward, or they are thrown to the right and left; while the knees and ankles seem about to give way, the effort to be steady or to produce any desired movement causing much exhaustion. At length, all attempts at walking fail; and without the support of two persons there is an inability to stand. Nevertheless, the muscular power is still so considerable, that when the patient is lying down it is very difficult to flex or extend his legs against his will.

These ataxic symptoms are accompanied by other nervous affections. The most common appear to be strabismus, ptosis, double vision, and diminished acuteness of the retinal perception. The strabismus and ptosis are often temporary; but the indistinctness of sight frequently merges into complete amaurosis, the result of atrophy of the retina. Deafness is very rare: difficulty of mastication, and dysphagia, are more common. The intellect and memory usually remain unaffected; though the general sensitiveness gets blunted, so that the grave nature of the condition is fortunately not appreciated. The pains are for the most part distressing; being sometimes sharp and sudden like shocks of electricity, on other occasions wearying and gnawing or boring and deepseated. Every now and then days of respite are obtained; to be succeeded suddenly by two or three bad

days, the suffering passing from the legs to the arms, from the latter to the head and face. The severity of the pain is aggravated by cold and damp, constipation, fatigue, or any kind of debauchery. Amongst other important symptoms, there is loss of sexual power; an inability to retain the urine; constipation, paralysis of the sphincter ani permitting of involuntary stools being very uncommon; numbness of the feet and legs, hands and arms; and a sensation as of a cord tied round the chest or abdomen. The power of distinguishing between heat and cold is only exceptionally impaired.

The *diagnosis* may be facilitated in many ways, during the early stage. Thus, an ataxic patient finds his difficulty in walking greatly increased by shutting his eyes. If he stand up with the inner edges of his feet applied to each other, he can only maintain this position, so long as his eyes are open: directly he closes them, he seeks some support to prevent his tottering limbs from failing to support him. Ataxy is at first most likely to be confounded with disease of the cerebellum; from which, however, it can be distinguished by the absence of that frequent vomiting and pain at the back of the head so characteristic of cerebellar affections.

The ultimate unfavorable *termination* of locomotor ataxy may be almost positively predicated. The only hope indeed is, that its progress will possibly be retarded. Cases which have remained stationary for several years are known. In many instances, although the tendency has been steadily from bad to worse, yet a fatal result has been deferred for six or eight or more years. On the contrary, the unfavorable symptoms have sometimes run on so rapidly, that within six months from the commencement all power of standing without support has become abolished. Death from some intercurrent affection—such as bronchitis, pneumonia, erysipelas, &c.—is not a rare event.

From *pathological anatomy* we learn that the spinal cord is always structurally affected in locomotor ataxy; the changes being most marked in the lumbar and lower part of the dorsal regions. The vertebræ, spinal canal, and membranes, are generally found healthy; though sometimes the posterior surfaces of the latter have been seen to be congested, or to be thickened by some exudation, or to be adherent to each other. These conditions, however, are not essential. The pathognomonic appearances are to be detected in the posterior columns of the cord, including the posterior nerve-roots. There is a destruction of nervous matter. According to Mr. Lockhart Clarke, "the alteration is peculiar, and consists of atrophy and disintegration of the nerve-fibres, to a greater or less extent, with hypertrophy of the connective tissue, which gives to the columns a grayish and more transparent aspect, and in this tissue are imbedded a multitude of corpora amylacea. Many of the bloodvessels that traverse the columns are loaded or surrounded, to a variable depth, by oil-globules of different sizes. For the production of ataxy it seems to be necessary that the changes extend along a certain length—from one to two inches—of the cord. The posterior nerve-roots, both within and without the cord, are frequently affected by the same kind of degeneration, which sometimes extends to the surface of even the lateral columns, and occasionally along the edges of the anterior. Not unfrequently the extremities of the posterior cornua, and even deeper parts of the gray substance, are more or less damaged by areas of disintegration."* If it be asked whether the change in the cord precedes that in the nerve-roots, the answer must be in the affirmative. With regard to

* St. George's Hospital Reports, vol. i, p. 103. London, 1866. A more complete account is also given in The Lancet, p. 618. London, June 10th, 1865.

other parts of the cerebro-spinal axis it is only necessary to say that the cerebellum has always been found healthy; while the cerebral nerves, excepting the fifth and seventh and eighth pairs, have been more or less diseased in different cases. The optic nerves especially have been seen to be almost destroyed; the mischief having extended from them as far as the corpora geniculata on the sides of the optic tracts. Mr. Lockhart Clarke has pointed out, that when the cerebral nerves are affected the morbid action travels from the periphery towards the centre, instead of from the centre to the periphery, as obtains with the cord and posterior roots.

I do not recollect having seen a case of locomotor ataxy where the patient has not previously learned from experience the inutility of medical *treatment*. In former times, I doubt not but that he was even more unfortunate; for if he were capable of analyzing the results which followed from the employment of setons and issues and blisters, cupping and leeches, shocks of electricity, and the ingestion of a heap of drugs, he could only have concluded that his miseries had been greatly aggravated by the doctor. But it is to be hoped, that in the present day we are more careful to do no harm where we cannot effect real good. There is certainly a much more happy desire to treat incurable diseases by attention to the diet and hygienic surroundings of the patient, than by physic.

With regard to medicines, in the present instance there is not one that deserves any confidence so far as curing the disease goes. The utmost that can be said in favor of the oxide of silver, nitrate of silver, hypophosphite of soda or lime, quinine, iron, and so on, is that they have no injurious influence. Yet this negative merit ought not to induce us to prescribe them. And I cannot help feeling that we are better discharging our duty when consulted in these cases by recommending warm clothing, a nutritious diet table, together with rest of those limbs which are gradually becoming incapacitated for all movement; than by leading the sufferer to believe that medicines, mineral waters and baths, methodical flagellation, blisters and galvanism, have virtues which they in reality do not possess.

At the same time that I profess this creed, it is not to be thought a patient must be told his sufferings cannot be relieved. A fair quantity of animal food, with stimulants and milk and cod-liver oil, will do much to lessen or postpone the neuralgic pains; though it may also be necessary to afford that comfort which can be given by properly regulated doses of opium, belladonna, or Indian hemp. So, likewise, the appetite will perhaps flag; and yet it can often be restored by quinine, or salicin, or small doses of the mineral acids with bitter tinctures. Again, sulphur baths, occasionally seem to mitigate the numbness and general uneasiness during the earlier stages of the complaint. Hence they may be tried; though the patient need not be sent abroad to use them. And lastly, attention will be needed to prevent constipation, which is apt to occur and to aggravate the pains. There is no objection therefore, to the occasional exhibition of a mild purgative; though as a general rule, simple enemata will answer every purpose.

5. INFANTILE PARALYSIS.—Speaking generally, this disease is by no means the same alarming affection as paralysis in the adult; for though infantile paralysis is often obstinate and occasionally incurable, yet it is not perilous to life. Moreover, it is very rarely the result of the same serious disease of the brain or spinal cord. The terms *myogenic paralysis*, and *essential paralysis of infants* have been applied to these cases of partial muscular paralysis, arising independently of any appreciable lesion of the nervous

system. The palsy often attacks only a single limb, as one leg, or very seldom one arm, or one side of the face, or even a single muscle like the sterno-mastoid, or a group of muscles; or one whole side of the body may be affected—hemiplegia; or the lower half of the body—paraplegia. The disease often dates from such an early period, that it appears most probably to be due to some defect of conformation. Such cases can of course only be remedied by well-adapted mechanical means to lessen the inconvenience of the deformity.

The evils which result from a persistence of the paralysis are very great; for if it is seldom followed by death, still it produces an altered condition in the nutritive functions of the affected muscles, and often leads to incurable deformity. Not only do the affected parts cease to grow in the same proportion as the healthy, but the limbs waste, owing to their being imperfectly nourished; while although they do not seem to want sensation; yet their power of motion is lost or diminished. Consequently if the child begins to walk, the leg drags, and as it fails to support the body, the little sufferer tumbles down. Supposing one arm to be paralyzed, it will soon be noticed that it is not used equally with its fellow, and that when raised, it falls, as if dead, by its own weight. In many instances, partial or complete loss of power over certain limbs or particular muscles of a limb, is noticed after slight and brief cerebral disturbance; while in other cases, the paralysis comes on during that irritable state of nervous system which coexists with teething. Sometimes, again, the palsy appears after either of the eruptive fevers, and frequently it supervenes suddenly, without any apparent constitutional derangement.

These paralytic affections have been mistaken for the stiffness of rheumatism, and occasionally for hip-joint disease. The absence of pain in palsy ought to be sufficient to prevent such errors. For although there is sometimes, especially in the early stages of paralysis, an exalted sensibility of the affected muscles or limb, still this is very different to the suffering caused by an examination of a diseased joint. Now and then a more cruel blunder is committed, and the child is thought to be malingering. On this principle he may be harshly treated; just as children have been whipped for wetting the bed, when the involuntary micturition has been due to an irritable condition of bladder, or a long prepuce, or a morbidly acid state of the urine. One other caution is necessary, and that is not to express too sanguine a hope of cure. The practitioner loses caste when it is found that his promises are not brought to pass, and when it is seen that a loss of power which it was said would be temporary, shows every probability of becoming permanent. Recovery occurs often—not always.

The paralysis which at times attends dentition, happens more frequently during the eruption of the permanent than of the temporary teeth. Where there is nervous disturbance with the first dentition, it occurs for the most part in the form of convulsions; in the second dentition, especially as the molars are being cut, there is a fear that paralytic affections may supervene. The following succession of events is now and then observed. A child goes to bed quite well, but passes a miserable and restless night. The next morning, when about to be dressed, the nurse finds that one arm, or an arm and leg, cannot be moved. There is probably no fever, neither are there any head symptoms. While there is loss of power, there is very slight, if any, diminution of sensibility. The parents hope that the numbness is temporary and of no consequence. Only as it becomes evident that there is paralysis, and that it is not passing off, is alarm felt. In such cases, the palsy either subsides in some ten or fourteen days, or in a month or two, or it proves to be incurable. In the latter case, indications of disease about

the nervous centres sometimes set in at the end of a few years, or even earlier. But more frequently the patient grows up, having a paralytic and withered limb for the remainder of life.

The pathology of these cases is at present obscure. That there is some disease of the spinal cord can scarcely be doubted; though it seems certain that the alteration is often only temporary. Possibly, as I think Dr. C. B. Radcliffe believes, the palsy may arise from spinal congestion.

The treatment of infantile palsy must vary according to the cause. In all cases the general health is to be attended to, and the functions kept as nearly normal as possible. Mild purgatives will often be needed, perhaps followed by tonics and nervous stimulants. Small doses of mercury, given as an alterative for a long time, have occasionally produced a remarkable amount of amendment; and so has the iodide of potassium with bark, or iodide of iron. The little patient, if under two years of age, with palsy of one lower extremity, is to be taught to walk while being supported in a go-cart, or in a baby-jumper; or if old enough, by means of a pair of crutches. It is of the greatest importance that the muscles of the arm or leg be daily exercised; hence friction and shampooing should be systematically and perseveringly used, together perhaps with very gentle shocks of electricity. The limb is also to be kept warm by wrapping it in flannel or chamois leather. With regard to special drugs, in addition to those already mentioned, it is to be remembered that cod-liver oil often does great good by nourishing the system. Small doses of steel, especially the chemical food (F. 405), ought to be given where there is anæmia. Sometimes, too, I have seen good in chronic cases from minute doses of strychnia. For a child four years of age, half a minim of the officinal solution (equivalent to about the two hundred and fortieth part of a grain of the salt) may be administered thrice daily; the strength of the mixture being cautiously and slowly increased to two minims. At the same time the food is to be good, with plenty of milk. A residence at the seaside, with tepid salt-water bathing, will greatly increase the chances of cure.

Facial hemiplegia is not unfrequently seen in infants soon after birth. It is probably caused by some injury to the branches of the seventh pair of nerves, either by the use of the forceps, or from pressure during the passage of the head through the pelvis. The distortion usually diminishes in a few hours, and quite disappears by the end of a week or two without any treatment.

6. SCRIVENER'S PALSY.—This disease may be defined as a spasm or cramp of certain muscles, which is only manifested when the sufferer attempts to execute some long-practiced and very familiar movement requiring the co-ordination of these muscles. There is, in fact, a partial loss of controlling power, so that the will can no longer compel a set of muscles to perform a series of acts to which they have so long been habituated that the necessary motions had become almost mechanical. The affection is named *scrivener's palsy*, or *writer's paralysis*, or *writer's cramp*; designations, however, which are not very appropriate, inasmuch as the artist, musician, compositor, shoemaker, saddler, seamstress, and even the milkmaid, are all liable to become incapacitated for their special work in exactly the same way. The penman does not really suffer more frequently than the members of any other class. He seems to do so, simply because the art of writing is universally acquired and practiced.

The *cause* of the disease is obscure. Of course, the suggestion naturally arises that it is due to overwork, but an examination of recorded cases seems almost to negative this view. If, however, undue exertion cannot be

set down as the starting-point, it is certain that exercise of the affected muscles materially serves to increase the disorder.

The *symptoms* make their appearance insidiously. At first, there is only a stiffness of the muscles of the arm, or forearm, or fingers of the right limb; and this comes on at the end of the day's labors, disappearing after a night's repose. Soon there is an unsteadiness of movement, so that the writer or artist every now and then produces an irregular scrawl or daub that was not intended, or the musician plays one or more false notes. Then an uncomfortable burning sensation is often experienced in the muscles of the hand or forearm, together with more or less aching, both of these symptoms, however, passing off after a few hours' rest. As the disorder progresses, so the inconvenience increases. Directly pen or pencil is taken in hand the spasm comes on. The thumb gets drawn into the palm, while the index and middle fingers become rigidly contracted. It is as if there were a limited chorea. And just as a child with St. Vitus's dance cannot put out its tongue, or walk, or sit still, as it could when well, so a man with scrivener's palsy cannot quietly hold his pen or sign his name legibly, though he may previously have been remarkable for his handwriting. At the same time, curiously enough, he can employ his hand for other purposes. I have seen a law-stationer's clerk cut up his food, comb his hair, fasten his clothes, use a button-hook,—in short, do anything but that by which he had been getting his living for nearly twenty years.

With regard to the *pathology* of the disease nothing is known. The disturbed force may commence in the spinal cord; but this is only a guess, and is not unlikely to be wrong. As scrivener's palsy does not destroy life the opportunities for examining the cord are very rare.

The *treatment* consists in giving complete rest to the affected hand. The clerk must forego writing, the artist should put away his pencil, the seamstress will have to use the sewing machine. Without rest, all remedies are useless; with it, a cure may be hoped for at the end of a few months, provided the means have not been rejected until too late. Where our plans are not fettered by the straitened circumstances of the patient the prescription should run thus: perfect rest of the affected hand. Mountain or sea air; a long voyage will be of great service. Nourishing food, with plenty of milk. Cod-liver oil.

Where drugs are demanded, the hypophosphite of soda, with bark or steel, will not do harm. Neither will quinine, or phosphate of zinc, or phosphate of iron. They may prove useless, but they cannot cause mischief, as is certain to ensue from strychnia, arsenic, mercury, iodine, nitrate of silver, electricity, cold douches to the head and neck, Turkish baths, &c.

Ofttimes the patient is driven to confess that rest and starvation are with him convertible expressions. Can he be helped for a time? Well, he may learn to write with his left hand, without much difficulty, but then, after an interval, this hand will probably suffer like the right. He is not unlikely to derive partial relief from using Perry's orthodactylic penholder, on the handle of which there are fixed three oval plates for resting the thumb and first two fingers. I have seen an invention of M. Velpeau's, consisting of a pear-shaped knob, with a tube at its apex for carrying a pen, and rests on the handle for the index and middle fingers. The knob is held in the palm of the hand, the relief, I suppose, arising from the spasm being kept off while the hand has something which it can firmly grasp. And lastly, instrument makers contrive simple leather or gutta-percha pads, by which the affected parts are supported. These pads are inexpensive, and can be made to fix the flexors of the thumb, and index, and middle fingers, so as to prevent their otherwise uncontrollable spasm.

7. HYSTERICAL, RHEUMATIC, AND DIPHTHERITIC PARALYSIS.—In *hysterical* palsy there is neither organic disease of the nervous centres nor of the motor nerves. The affection is manifested in hysterical women, and is sometimes directly traceable to fright, overexcitement, ovarian irritation, loss of blood, insufficient nourishment, &c. The muscles of the lower extremities may be affected—hysterical paraplegia; or the muscles of the arm and leg on one side—hysterical hemiplegia; or the loss of power will be limited to one particular muscle, or to a group of muscles. There are almost invariably other symptoms of hysteria present, while the uterine functions are scarcely ever performed in a regular and painless manner. Constipation and indigestion with flatulence, backache, and tenderness all over the sacrum, bearing-down pains, irritability of the bladder, neuralgic pains about the inside of the thighs, with a more or less copious leucorrhœal discharge, all betoken derangement in the functions of the pelvic viscera. The pathology of all forms of hysterical paralysis seems to be, that there is a state of imperfect nutrition, which especially lowers the tone of the nerves of the palsied muscles, and very probably affects the nervous centres also. How far this state of mal-nutrition is brought about by moral causes, and to what extent the latter are influential in keeping up the palsy, we need not now inquire. The pivot on which our treatment must turn is the existence of this depraved state of general nutrition. Hence, the remedies are steel, quinine, cod-liver oil, cold or tepid bathing, mental occupation, and good food, together with friction and galvanism of the affected limb. By these agents, always in co-operation with tact and unwearied patience on the part of the practitioner, a cure can be achieved, so that, as Carlyle says, the patient shall remain "no longer the victim of nerves, but the vanquisher."

Rheumatic paralysis may attack the muscles of one or both lower extremities; or the extensor muscles of the forearm; or only the deltoid or trapezius, rendering it impossible to raise the arm. The symptoms of loss of power, the increased sensibility of the parts affected, and the general depression, will come on suddenly or gradually. It is not improbable that the affection has its origin in rheumatic irritation or inflammation of a limited portion of the membranes of the spinal cord. At all events, the remedies which mostly succeed are iodide of potassium and cod-liver oil; with the warm douche, hot air or vapor baths, shampooing, and electricity.

Among the other secondary nerve affections which follow *diphtheria*, paralysis claims a prominent position. Generally it comes on a few days after convalescence has set in. According to most authorities, there is a primary peripheral change in the nerves of the part which has been affected, this alteration being propagated to the spinal centre. The muscles of the soft palate, fauces, and pharynx suffer the first and most severely, causing the act of deglutition to be performed with difficulty. The loss of power, and especially that of swallowing of fluids, will now and then persist for months. The muscles of the neck are occasionally palsied, so that the head cannot be properly supported: or one or more of the limbs are attacked; or there is paralysis of the ciliary muscle (?) causing defective vision. Together with the loss of motor power in the constrictors of the pharynx, there may be more or less anæsthesia; and consequently, without considerable caution food will lodge in the gullet and produce fatal choking. The length of time that the paralysis lasts, is liable to great variety. The important point is, that ultimately the power becomes restored, recovery being the rule, and not the exception. The chief remedies are rest, animal food with milk, cod-liver oil, steel, and strychnia.

8. LOCAL PARALYSIS.—Of the different varieties of local palsy, I shall only mention *paralysis of the face*, the effect of pressure on, or injury to, the portio dura or facial portion of the seventh pair of nerves; a nerve which is very rarely affected by disease of the brain. As one-half only of the face is usually palsied, the appearance is remarkably striking. All symmetry between the two sides of the countenance is destroyed; the profile on the paralyzed half being blank, unmeaning, and void of expression. The features get drawn up on the healthy side. The orbicularis palpebrarum muscle is powerless, and therefore the patient is unable to close the eyelid sufficiently to cover the eyeball. Moreover, he cannot frown on the affected side, the nostril does not dilate, the cheek hangs loose, he cannot blow, and the angle of the mouth droops. The fifth pair of nerves is usually unaffected; for the muscles of mastication act properly, while there is no loss of sensibility. The food, however, gives trouble by lodging between the cheek and teeth on the palsied side; while the saliva also dribbles from the same angle of the mouth. Where the motor branch of the third division of the fifth nerve is involved, there will be palsy of the movements of the jaw on the affected side. In any case the paralysis is generally free from danger, being but rarely connected with intracranial disease. There is no loss of hearing, sight, or speech; if the latter be at all affected it will be in the pronunciation of labial consonants and vowels, and then perfect power can be restored by supporting the drooping angle of the lower lip with the finger. The more complete the palsy, the more favorable may our diagnosis be; inasmuch as partial palsy (*e. g.*, ptosis, or an inability to lift the upper eyelid from loss of power in the superior branch of the third nerve) is more frequently the result of cerebral disease, than of temporary external mischief.

Paralysis of the portio dura on both sides is a rare affection. Owing to the symmetrical nature of the disease in such cases there is no distortion of the features, as happens when one nerve only is affected. But on close examination, the lineaments will be found fixed. The nostrils are motionless; the cheeks flat and relaxed; there is inability to close the eyes completely; and there is defective articulation with regard to the sounds formed by the lips, while the lingual articulation is unimpaired.

Exposure to cold is a frequent source of paralysis of the portio dura; and so is debility from any exhausting influence. In cases where no appreciable cause can be detected, the mouth should be examined; so that if there be any decayed teeth or stumps they may be extracted. In children, otitis leading to caries of the petrous portion of the temporal bone not unfrequently produces the loss of power.

Pure facial palsy may have a duration of from ten days to many weeks. Where it does not get quite well, there is no fear of its shortening life, unless there be disease of the temporal bone. The patient's mind must be made easy with respect to this absence of danger; while aperients, tonics, iodide of potassium, warm douches, shampooing, and galvanism, are the remedies to be resorted to.

9. PROGRESSIVE MUSCULAR ATROPHY.—This curious disease has only been recognized as a distant affection since the year 1853. It has been described under various names,—such as *Creeping palsy*, or *Peripheric paralysis*, or *Lead palsy without lead*, or *Paralysie musculaire atrophique* (Cruveilhier), or *Atrophie musculaire avec transformation graisseuse* (Duchenne). Dr. W. Roberts, in an excellent essay on the subject, states that he was inclined to call it *Idiopathic degeneration of the voluntary muscles;* but as this name was too cumbrous, and might not prove correct in the end, he

preferred the more homely one of *Wasting palsy*. This title, however, will have to give way to that of *Progressive muscular atrophy*, according to the Nomenclature proposed by the Royal College of Physicians.

Symptoms.—The pathognomonic feature of this disease is a degeneration, and consequent loss of volume and power, of the voluntary muscles, there being no diminution of the intelligence or of the sensibility of any part of the body. The first symptom has sometimes been pain in the ball of the thumb, followed by weakness of the upper extremity. The atrophy will occasionally be confined to this arm, or it affects both upper limbs, or the lower limbs, or more rarely the voluntary muscles of the entire body—of both the trunk and the extremities. Fibrillary tremors or convulsive quiverings of some of the fasciculi which form the muscle, can often be noticed by the attendant, though the patient may be quite unconscious of their occurrence. Anything which irritates the skin will produce these muscular vibrations. There is weakness that increases daily, though slowly; and which patients at first describe as an unwonted lassitude of the limbs. The wasting of the muscles gives rise to a peculiar withered look in the parts affected; while as the muscular atrophy is often unequal on the two sides of the body, distortions arise—the muscles least diseased overcoming the resistance of those most affected. Tactile and common sensibility are usually unimpaired; there is no tremulous agitation, as in paralysis agitans; occasionally neuralgic or rheumatic pains are complained of, and there is great sensitiveness to cold. The intellectual powers are undisturbed, and the judgment remains sound; while the general health long continues moderately good, unless there be difficulty in taking food owing to the muscles of both mastication and deglutition being involved. In one distressing example which I have seen, there was no diminution of sensibility, but simply a complete inability to move either the upper or lower extremities; so that the patient was obliged to be fed and carried about like a child. Death, I believe, occurred from an attack of bronchitis. Fatal asphyxia is a very common termination of these cases. For when the diaphragm and intercostals become involved, the thoracic movements get reduced to a slight motion of the lower ribs; and consequently if any mucus be poured out, it must accumulate and produce suffocation, since no sufficient efforts can be made to dislodge it.*

* Few of the reported examples of wasting palsy are more interesting than the one published by Cruveilhier (Archives Générales de Médecine, cinquième série, tome i, p. 571, Paris, 1853), and I shall therefore give a condensed account of it. This case is the more deserving of attention since from it Cruveilhier first determined the existence of a new form of paralysis, unconnected (as he believed) with either cerebro-spinal disease or metallic poisoning. The chief points are these: A mountebank, thirty-two years of age, came under observation in July, 1850, suffering from atrophic muscular paralysis, which had already become almost general. According to his account, in September, 1848, he passed the night in the open air, on the muddy pavement, and awaking, found his right side, on which he had slept, quite benumbed. The warmth of a tavern soon restored both sensation and motion; but three weeks afterwards he noticed a weakness of the right hand, he could not take hold of objects, and was henceforth unable to play the cornet-à-piston. For a year the weakness was confined to the muscles of the hand; but he then passed another cold wet night in the open air, and afterwards felt a great weakness in the lower limbs. From this time the muscular paralysis progressed rapidly, so that when he entered Cruveilhier's wards, in July, 1850, not only were the extremities affected, but also the facial muscles and those concerned in articulation and deglutition and respiration. Still the patient could dress himself and walk, though with trouble; while he was able to feed himself and to articulate intelligibly. The muscles were agitated with a fibrillary quivering or tremor—a kind of twitch, such as would be produced by an uninterrupted succession of mild electric shocks. The tactile sensibility was developed to its highest degree, the organs of special sense

Prognosis.—The duration of wasting palsy may be said to vary from nine months to five or six years, although in one instance death did not occur till after the lapse of more than twenty years from the commencement of the symptoms. In some few instances complete recovery seems to have taken place, whilst in a larger number the progress of the disorder has been permanently suspended. When the disease has invaded the trunk, the prognosis is most unfavorable; but as long as it is confined to the extremities there is hope of arresting it. Most frequently, however, death results from it sooner or later.

Etiology.—General muscular atrophy—that of the trunk and extremities, spares neither children, nor adults, nor aged people: whereas, the partial form would appear to be most common between thirty and fifty years of age. Males are much more liable to the disease than females, perhaps owing to their occupations. It is certainly hereditary. Exposure to wet and cold, or very hard work, are often the assigned causes; blows upon the spine, and shocks to the cord, seem to have had an influence in producing it in some of the reported cases, while Dr. Roberts shows that when it arises from cold the atrophy is much more likely to extend to the muscles of the trunk than when it has its origin in overwork.

Pathology and Morbid Anatomy.—We are perhaps scarcely yet in a position to decide upon the nature of this disease. According to some authorities it has its starting-point in the nervous system, the affection of the muscles being secondary. Three or four years since most observers were

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were remarkably delicate, the intelligence was perfect, and he used thus to describe his condition: "I am not ill, but my strength is gone, and my weakness increases daily. There is a feeling of great lassitude in my limbs, which torments me every hour, but especially at the time of awaking from sleep." At the end of 1851 this man could not walk at all, neither had he the power to change his position without help. His food was given to him, and he was put to bed like a little child. The saliva could not be swallowed, but ran from his mouth. The buccal portion of the act of deglutition could not be effected, owing to almost complete paralysis of the tongue; twice he was nearly choked by pieces of vegetable lodging in the pharynx, and his appetite was voracious. To feed him, the nurse was in the habit of thrusting the spoon filled with food down low into the pharynx; considerable efforts at swallowing on the spoon and its contents were then made, and the former being withdrawn, repeated attempts at deglutition followed. In trying to swallow liquids, the greater part was always returned. The power of articulation being lost, the wants were made known by nods, by the eyes, and by a guttural nasal sound. The respiration was very incomplete; so that it seemed certain that the unhappy man, whose intelligence was unimpaired, was menaced every moment with asphyxia. On January 15th, 1853, he was seized with the prevailing influenza, and being unable to expectorate the mucus, was one morning found quite dead.

At the autopsy it was shown that the *brain* was perfectly healthy, and weighed 36 ounces 163 grains avoirdupois. The *spinal cord* was sound, and of the usual bulk, consistence, and color. The *anterior roots of the spinal nerves* were remarkably small compared with the posterior; for whereas in health the posterior or sensitive roots are to the anterior or motor as 8 to 1 in the cervical region, 1½ to 1 in the dorsal, and 2 to 1 in the lumbar; here the proportion was as 10 to 1 in the cervical, and 5 to 1 in the dorsal and lumbar regions. Moreover, many of the anterior cervical roots were reduced to mere neurilemma, and presented no trace of nervous tissue when examined with a lens. The *muscles* of the pelvis and thigh had escaped the atrophy; while the elevators of the lower jaw, the muscles of the pharynx, those of the supra- and infra-hyoidean regions, the platysma on both sides, and the zygomatics had undergone simple atrophy or emaciation. Other muscles were wasted and pale; while most had undergone atrophy with fatty degeneration. Several seemed at first sight to have disappeared, so thin and slender were their remains. There was not a single muscle of the upper extremities unaffected; those of the hand being the most atrophied, then those of the shoulder, forearm, and upper arm. The tongue was changed into a fatty mass, in the midst of which appeared a number of vertical muscular bundles.

inclined to agree that this position was untenable; and it was generally believed that the disorder consisted of a granular and fatty degeneration of the muscular fibre, similar to that which is observed in fatty heart. It was said, that although there is no general depression of the nutritive functions, yet there is an error of nutrition affecting the muscular fibre owing to some unknown constitutional peculiarity.

The post-mortem appearances seemed to confirm these remarks. The heart, liver, kidneys, and spleen, have been always found healthy, as have also the brain and medulla oblongata. In two-thirds of the reported cases the spinal cord was said to be in a normal condition; while in three instances there was inflammatory softening, and in one amyloid degeneration of the posterior columns. The anterior roots of the spinal nerves were diminished in size in some instances, but by no means in all, although such a change has been carefully looked for since Cruveilhier imagined that he had discovered the essential nature of the disease in this alteration.

There is a great probability, however, that in some of those instances where the cord is said to have been found healthy it has not been properly examined (see p. 289). In one instance widespread degeneration of the spinal marrow was detected. Then in another example, where Mr. Lockhart Clarke minutely examined the spinal cord a few days after its immersion in a weak solution of chromic acid (gr. 3 to each ounce of water), this gentleman found a peculiar degeneration and softening of particular points of the gray substance of the cord, from which he concluded that the disorder began in the cord, and not in the muscles as a consequence of defective nutrition.

The muscles which had lost all power during life have always been found after death to be wasted, and sometimes to be really annihilated. At most examinations it is reported that the muscular fibres were of a pale red or buff color, while often to the naked eye they presented evidence of fatty degeneration. From the results of the microscopic examinations, it may be said that the muscular fibrillæ had degenerated into a granular amorphous substance, or into fat-globules, the empty sarcolemma or tunic of the elementary fibre having been broken up, so that only a little connective tissue was left. The degeneration sometimes appeared to be entirely granular and not fatty, while in other instances the fat was abundant.

Treatment.—It may be instructive to mention that amongst the remedies which have certainly failed to do good, we must place strychnia and nux vomica; setons, issues, or blisters over the vertebræ, and cold baths during the active stage. With one exception, mercury and iodide of potassium have proved useless, and it is very doubtful if there has been any greater success with tonics and cod-liver oil.

Wunderlich and Vulpian have obtained good results from the administration of nitrate of silver; the first physician employing this salt in doses of gr. $\frac{1}{20}$ thrice daily, while the second gives gr. $\frac{1}{8}$ twice or thrice in the day. Under its use the sense of touch has been rendered more acute, the neuralgic pains have ceased, the sensibility to cold has diminished, the appetite has increased, and the general nutrition has improved. It is much to be feared, however, that no such favorable consequences as these will be obtained in this country, from this or any other silver salt.

Galvanism applied locally to the wasting muscles is said by Dr. Roberts to be the most effective remedy. Duchenne seems to have been particularly successful in the treatment by localized faradization (the electricity of the induced or secondary current in the helix round the magnet, discovered by Faraday); but he advises the careful use of this agent, not giving more than one minute to each affected muscle, lest it become fatigued

and exhausted, and not prolonging each sitting for more than ten or fifteen minutes. With galvanism there may be combined gentle frictions, occasional warm sulphur baths, the use of such remedies as will improve the quality of the blood, and methodical exercise. When the disease has become stationary, galvanism may be more freely resorted to, together with cold bathing.

10. **MERCURIAL PALSY.**—Mercurial Palsy, or mercurial tremor as it is sometimes termed, consists of a kind of convulsive agitation of the voluntary muscles, which is increased when volition is brought to bear upon them. In advanced stages of the disease, articulation, and mastication, and locomotion are performed with difficulty, while the use of the hands is almost entirely lost. The tremor prevents the performance of most combined movements. The skin acquires a brown hue and the teeth turn black. Workmen exposed to the fumes of mercury, such as gilders of buttons, glass-platers, barometer-makers, &c., are very liable to it.

In the *treatment* of mercurial palsy the patient must be withdrawn from the injurious atmosphere. If the case be taken in time, sulphur baths, good diet, sea-air, and iodide of potassium (for reasons to be presently mentioned) will generally effect a cure.

11. **LEAD PALSY.**—This is an affection which usually follows or accompanies *colica pictonum*, though it may exist independently. The poison of lead appears to exert some peculiar noxious influence over the nerves of the forearm and hand. In consequence of this the extensor muscles of the hands and fingers become paralyzed, so that when the arms are stretched out the hands hang down by their own weight, or, as the patient say, the *wrists drop*. The inferior extremities are very rarely affected. The sufferers frequently experience attacks of lead colic. The odor of the breath is peculiar (saturnine), and there is a similar kind of taste. A characteristic symptom of the presence of lead in the system is the existence of a blue or purplish line—the sulphuret of lead—round the edges of the gums, just where they join the teeth; a very important aid to diagnosis, for the notice of which we are indebted to Dr. Burton.* Plumbers, painters, color-grinders, type-founders, &c., are the usual sufferers from this affection. Occasionally it is met with on board ship during long voyages, owing to the use of minium in the apparatus employed for distilling sea-water. Zinc pipes containing lead are also now and then improperly employed. The use of snuff which has been packed in lead has caused symptoms of incipient palsy. But cases of lead poisoning are sometimes met with among the public generally, the source of the mischief being, in most instances, traceable to the employment of water which has either been kept in, or transmitted through, leaden vessels.

The question naturally suggests itself, What is the particular organ affected in the cases where the mischief arises from the handling of lead compounds? Dr. Todd answered this moot-point by stating his belief that the muscles and nerves are early affected, and that subsequently the nervous centres become implicated. The muscles being contaminated by the lead, their nerves participate in this contamination. The nervous system is, therefore, first vitiated at the periphery in the nerves; and the poisonous

* The formation of the blue sulphuret of lead is probably due, as was suggested by Dr. Pereira, to the action of sulphuretted hydrogen (evolved by the decomposing particles of food lodged between the teeth) on lead contained in the saliva and buccal mucus.

influence continuing, the deterioration gradually advances to the centres. This is thought to be proved by the occurrence, first, of local paralysis in these cases, and subsequently of epileptic convulsions or other symptoms of centric disease.

The operatives in lead works and in mines suffer much from the saturnine emanations. The work-rooms where the manufacture of white lead is completed, have the atmosphere loaded with minute particles of lead-compounds, so that the men and women employed in them get their systems contaminated chiefly through the respiratory organs. They become "leaded," and hence are rendered the victims of paralysis, colic, gout, spasms of the respiratory muscles, and sleeplessness. They get wan, pallid, feeble and suffer much from neuralgia.

Death may occur when the system has been long exposed to the influence of lead, this termination being most common in those addicted to intemperance.

The *treatment* of lead palsy has been very much facilitated by the hypothesis promulgated by M. Melsens, that the baneful effects of lead and mercury are caused by the chemical combination of these metals with the tissues of the body, or by their being present in intimate union with these tissues in some analogous manner. The therapeutical application of this theory necessarily was, as pointed out by Dr. J. R. Nicholson, that the action of the curative agent must be directed to the conversion of the poisonous metal into a compound having less affinity for those tissues, and which therefore can be readily eliminated from the body. Now it has been shown that iodide of potassium possesses the requisite conditions for becoming a curative agent in lead diseases according to this theory, and consequently this drug has superseded all others.

Dr. Nicholson has published a very interesting case in which the lead, after the administration of the iodide of potassium, could be distinctly detected in the urine, notwithstanding it was not to be found before the commencement of the treatment. In this instance the colic entirely ceased, but the palsy persisted. Galvanism was then used in conjunction with the iodide of potassium, and the patient went to his work, about fifty days after the commencement of the treatment, without any trace of paralysis. From this result it is concluded: First, that the iodide of potassium acts as a curative agent in lead-poisoning, by converting the lead into a form which can again be readily taken up by the blood and evacuated by one of the natural outlets. Secondly, that the iodide acts most speedily in conjunction with galvanism, when employed for the relief of lead paralysis.*

Finally, in addition to the iodide of potassium (gr. 5–10 thrice daily), the patient may use warm or sulphur baths (F. 125); while galvanism and friction to the paralyzed limb, a nourishing diet, and exercise in the fresh air ought generally to be had recourse to. To prevent any injurious influence, Liebig recommends all workers in lead to drink sulphuric acid lemonade daily. This acts probably by converting the salt of lead, as it enters the system, into an insoluble sulphate. Cleanliness is also an excellent prophylactic.

12. PARALYSIS AGITANS.—This disease is characterized by a tremulous agitation—a continued shaking—usually commencing in the hands and arms, or in the head, and gradually extending over the whole body. Mr. Parkison has well defined the disorder thus: "Involuntary tremulous motion, with lessened muscular power, in parts not in action, and even

* The Lancet. London, October 14th, 1854.

when supported, with a propensity to bend the trunk forward, and to pass from a walking to a running pace; the senses and intellect being uninjured." The disease progresses slowly. When it is far advanced the agitation is often so violent as to prevent sleep. The patient cannot carry food to his mouth; while deglutition and mastication are performed with difficulty. He is liable to trip, owing to his hurried and shuffling gait. The intellect is unimpaired. Mental excitement always aggravates the tremor. As the disease extends, the body becomes inclined forwards, and the chin bent on the sternum. The wearisome movements cause exhaustion; the agitation gets extreme; and the violent tremors do not even cease at night. It soon becomes evident that the constitutional powers are daily getting lessened; food can hardly be swallowed; the urine and fæces pass involuntarily; and coma with slight delirium closes the scene.

As regards the remedies for paralysis agitans I can say but little, since I know of no measures likely to do much good. I should, however, try the effects of pure air, nourishing diet, simple warm or sulphur baths, ferruginous tonics, cod-liver oil, and occasional opiates. A cure is said to have been effected by the employment of the continuous galvanic current, such as may be derived from a Pulvermacher's chain-battery of 120 links.

XII. CONVULSIONS.

The subject of convulsions is a very complicated one. To endeavor to simplify it, an arbitrary arrangement of the matter will be made; so that this symptom of disease as it occurs in adults, in children, and in pregnant or parturient women, will be considered separately. It is distinctly to be understood, however, that this plan has little or nothing to recommend it beyond expediency.

1. **CONVULSIONS IN ADULTS.**—Amongst the many prominent symptoms which accompany disturbances of the nervous system, few occasion greater alarm to the friends of the patient than an attack of convulsions or "fits." This is partly due to the suddenness with which the paroxysm comes on, the general struggles and the distortion of countenance which it produces, and the complete loss of consciousness that attends it.

By way of definition, convulsions [from *Convello* = to overthrow, to annihilate, &c.] may be said to consist of violent and involuntary contractions of the muscles of the body; occurring in paroxysms, and often associated with insensibility. Sometimes the contractions are partial, of considerable duration, attended with hardness of the affected muscles, and not accompanied by unconsciousness; such being known as *tonic* spasms [from Τείνω = to strain or tighten], or as *spastic* contractions [from Σπάω = to draw + the terminal -ικος]. Examples of these are seen in tetanus and common cramp. In another variety there are rapidly alternating contractions and relaxations—*clonic* spasms [from Κλονέω = to put in commotion]; subsultus tendinum, or that catching of the tendons of the hands and feet which occurs in the last stages of low fever, being an instance of this kind. And again there are *epileptiform*, or *epileptoid* attacks [from *Epilepsia* + the terminal *-ides* = resembling epilepsy], in which we find sudden loss of consciousness and voluntary motor power, with clonic spasms; the fit lasting from one or two to twenty minutes, and ending in more or less exhaustion with a tendency to sleep.

The *causes* of an attack of general convulsions are to be found in all those conditions which suddenly arrest the nutrition of the brain. Hence a seizure may be due to cerebral hemorrhage, to thrombosis and embolism of the cerebral arteries, to the rupture of an intracranial aneurism, to concussion of the brain, and possibly to some sudden congestion of a syphilitic or cancerous tumor within the skull. Attacks are readily produced by quickly cutting off the supply of healthy blood to the nervous centres; so that we generally find convulsions preceding death from rapid hemorrhage. Animals killed in the slaughter-house by dividing the large vessels in the neck are violently convulsed before death. So also convulsions were frequently seen in the sick-room some thirty years back, when patients were bled to "incipient syncope" for the purpose of diagnosis; and when, for extinguishing inflammation, Wardrop and Marshall Hall were in the habit of taking away from one hundred to one hundred and twenty ounces of blood in a short space of time. Strange to say, venesection was lauded as the most valuable of remedies; though the last-named physician allowed that in his own practice, as well as in that of others, excessive bleedings often occasioned convulsions which endangered the patient's lives. Convulsions from a morbid state of the blood are far from uncommon. They are witnessed when the due oxygenation of the circulating fluid is suddenly impeded; as from mechanical obstruction and spasm of the glottis, or the inhalation of poisonous gases. In acute atrophy of the liver death is usually preceded by convulsions. When, in renal disease, urea and other ingredients of the urine are not properly eliminated, the nervous system gets poisoned, and convulsions may ensue. The uræmic convulsions of pregnant and parturient women are examples of this condition. And lastly, it seems certain that the abnormal excitement of organs distant from the brain can provoke convulsions; probably by irritation of the vaso-motor nerves causing spasm of the muscular coats of the cerebral arteries. In this way fits take place in young children from teething, the presence of indigestible food in the stomach, the irritation of threadworms in the rectum, &c.

Speaking very generally of the *symptoms* of convulsions it is to be noticed, that with or without premonitory indications, there is a sudden loss of consciousness, accompanied by irregular and powerful contractions of the muscles. The limbs are affected with clonic spasms, and at the end are spasmodically extended. All the voluntary muscles may be attacked; or there will be only spasms of the features, or of one half of the body, or of a single limb. During a general paroxysm the countenance is much distorted; the face being commonly pallid or livid. The eyeballs seem staring and motionless; there is generally insensibility to light; and the pupils are usually widely dilated, though not as much so as in poisoning by belladonna, in which the irides are sometimes scarcely to be seen. Grinding and gnashing of the teeth, protrusion of the tongue and injury of this organ from its being bitten, laborious respiration, stertorous breathing, involuntary evacuations, &c., are commonly observed. As the attack subsides, it leaves a disposition to sleep. In adults a fatal result is rare unless the convulsion have its origin in severe cerebral or renal disease.

The *treatment* of convulsion as an entity, so to say, calls for little comment. The difficult point, though one always to be attempted, is to trace this symptom to its cause. Of course, if this be impossible, we must place the patient in such a condition as to help his recovery; even if this is only to be temporary owing to some incurable primary malady. His dress is to be loosened and all clothing about the neck removed. He is to be placed so that pure and cool air may be breathed, while care is taken to prevent his falling off the bed. Subsequently, cold can be applied to the

d if there be much heat or flushing; with warmth and sinapisms to the remities. The practitioner who, knowing nothing of the source of the turbance, feels that he must still do something more, can select what he es from such remedies as purgative and antispasmodic enemata, ammonia the nostrils, spirit lotions for the scalp, chloroform inhalation, dry cupng, &c. It is, however, rather confusing to find a gentleman with a self-plauding air applying cold affusion to the head of his patient, a blister the nape of the neck, mustard to the feet, and croton oil to the tongue; en hesitating as to whether he shall select leeches or venesection or galanism, the inclination being towards the first; and all for what? Because e unfortunate sufferer has had a fit of convulsion owing to the rupture of cerebral aneurism, and is lying in a state of deep coma. So again I have een a young child with its upper and lower gums deeply gashed, the liagnosis being "convulsions from teething;" the real sequence of events aving been mild scarlet fever, acute renal disease with albuminuria, and remic poisoning. As before remarked, there is often very great difficulty in finding out of what disease the convulsion is a symptom; while sometimes it is impossible to form any conclusion as to whether the nerve-tissue is simply irritated, or badly nourished, or poisoned, or irreparably injured. Unhappily, there is an equal difficulty in persuading the practitioner to hold his hand under such circumstances. He is impatient to do battle with his enemy—disease, though he cannot distinguish him; forgetful that in the mêlée he is just as likely to favor as to oppose the progress of his foe.

2. **INFANTILE CONVULSIONS.**—From the time of birth until the end of the seventh or eighth year convulsions are of rather frequent occurrence, inasmuch as they are produced by a variety of circumstances; but they are most common during infancy, since this is not only an excitable period of life, but the immature nervous centres are exposed to peculiar sources of irritation. The attacks very commonly (supposing they are not symptomatic of severe cerebral disease) pass off without any bad result. When, however, they recur frequently they are very likely to weaken the intellect, and to impair the general health; while in some instances they prove the immediate cause of death.

A few days after birth, the young child is apt to suffer from slight convulsive movements, to which nurses give the name of "*inward fits.*" The baby lies as though asleep, rolls its eyes about or has the corneæ drawn up under the upper lids, moans gently, breathes with a little difficulty, and has twitchings of the muscles of the face: sometimes there is a livid ring round the mouth. This condition arises from flatulence and indigestion; and is a warning that the quality of the food should be looked to. It is relieved by gentle friction over the abdomen; together with the administration of two or three drops of aromatic spirits of ammonia, the same quantity of spirit of ether, and a teaspoonful of dill-water.

Causes.—Anything which rapidly depresses the nervous system, or which interferes with the due performance of the functions of the nervous centres, is likely to induce a fit of convulsions. Hence the fits may arise from structural disease, such as tubercular meningitis, phrenitis, apoplexy, &c.; from an insufficient supply of blood to the brain, as may be noticed in weak and badly nourished children, or in those debilitated by profuse diarrhœa; or from a supply of impure blood, examples of which occur at times during the course of the eruptive fevers, or the progress of renal disease. Again, these seizures are now and then due to distant irritation reflected to the brain, such as arises from the pressure of a tooth upon the inflamed gum

during dentition, or from intestinal worms, or the passage of a renal calculus, or simple indigestion, or a pin or needle sticking in the body; to general irritation produced by exposure to a cold and damp atmosphere; and lastly they may be produced by fright, and by causes which we cannot discover. Moreover it may be noticed that all such circumstances as would give rise to delirium in the adult, will probably induce convulsions in the infant.

Mr. North observes, that the children of parents who marry at too early or at too advanced an age are more susceptible of convulsions than the progeny of those persons who marry in the prime of life. Hereditary predisposition has been also observed. Thus Boerhaave states that all the children of an epileptic man died of some convulsive affection. A remarkable instance of this derivative proclivity has been narrated by Dr. Duclos.* The case is that of a woman, aged 34, one of eleven children, six of whom had died of convulsions. She had herself had frequent attacks of eclampsia until her eighth year; which attacks had left slight deviation of the mouth, with ptosis of the left upper eyelid. This woman had ten children, who all had convulsions; five having died in the first two years of life, and one when three years old.

The frequency and the fatality of convulsions diminish in a marked degree as the organization of the nervous system becomes more perfect. This is clearly shown by a reference to the reports of the Registrar-General. Taking the last of these, we find the deaths in England from "convulsions" during the year 1866 were registered as 27,431; of which number 26,847 occurred in children under five years of age, 24,577 of these being infants under one year. These figures do not include the deaths from epilepsy, which disease was fatal in 1866 to 2468 persons; only 146 being children under five years.

Symptoms.—In slight cases the symptoms are merely such as I have just described as inward fits: generally they are much more severe. The attack comes on suddenly, like a fit of epilepsy, and without warning. Sometimes the child utters a sharp cry, sometimes there is no sound. It perhaps looks unusually bright for a few seconds, stares vacantly, loses consciousness, has the respiration momentarily suspended, and has its body rendered stiff and immovable. Then the seizure may end. Most times, however, clonic spasms set in. The muscles contract and relax involuntarily; the limbs are quickly flexed and extended; the hands are generally firmly clenched, while the thumbs are turned inwards on the palms; and the head is jerked backwards and forwards, or laterally. The countenance is rendered frightful, for the muscles of the face twitch violently and rapidly, and the lips are drawn in all directions; while the integuments of the head and face become red and then livid. There is often convergent strabismus: the eyes roll and start, and the pupils are dilated and usually insensible to light. The respiration is irregular and laborious. The pulse is very frequent and small. The spasmodic action of the abdominal muscles causes the contents of the bladder and rectum to be voided involuntarily. At the end of some eighty to one hundred and sixty seconds (the time seeming much longer) a deep inspiration announces that the fit is over. The limbs and features relax, and the natural appearance returns; the blood becomes properly oxygenated, and the lips and face assume their healthy hue. The child perhaps looks frightened and cries; but more frequently it falls into a sound sleep directly. During this, its body gets bathed in perspiration.

* Etudes Cliniques pour servir à l'histoire des Convulsions de l'Enfance, p. 75. Paris, 1847.

In unfavorable cases the child sinks into a state of complete coma, and perhaps dies. It is rare for the fit to be single: usually it returns after a longer or shorter interval. Occasionally only one side of the body is convulsed; or only one limb; or merely the muscles of the face are affected. In all cases the muscular actions are rarely equal on the two sides of the mesial plane; and therefore the eyes, countenance, and general frame appear greatly distorted and make the aspect of the little patient perfectly distressing. The more feeble the attack, the longer its duration. Sometimes the convulsive phenomena appear to be almost continuous for several hours, so short are the intervals between the fits. Not uncommonly they cease for three or four hours, and then return; so that there may be half a dozen paroxysms during the day. The sequelæ most to be feared are infantile palsy; hemiplegia; permanent squinting; some defect of sight or hearing, or power of speech; and disorder of the mind, varying from the slightest form of disturbance as shown by an uncontrollable temper, to complete idiocy.

Treatment.—This will of course vary according to the circumstances of each case, and the exciting cause of the attack. Nevertheless, the broad principles of treatment are as follows: During the fit it will be advisable to avoid all unnecessary interference; it being generally sufficient to rapidly loosen the clothing about the neck and chest and waist, and to admit plenty of fresh air. The head can be raised and the face sprinkled with cold water, if the practitioner have any faith in such proceedings. Subsequently if a recurrence of the fit be feared the warm bath may be of signal service, cold being at the same time applied to the head; or a gentle douche of cold water over the occiput will possibly be beneficial. Wet cloths, as well as bladders containing pounded ice laid upon the top and back part of the head only do harm. When the bowels are confined, gentle antacid purgatives will be needed; when there is much flatulence, carminatives; when the stomach contains undigested food, emetics. Supposing the irritation is due to dentition, and the tense gum appears to offer an obstacle to the passage of the tooth, lancing this fibrous texture is to be had recourse to. Then, as a medicine from which more may be hoped for than from any other, I would advise the exhibiton of the bromide of potassium, giving it even in enemata of beef tea, when there is an inability to swallow. Subsequently, where there is restlessness, sedatives, especially the hydrocyanic acid, with a few drops of tincture of hyoscyamus, had better be prescribed. If there are intestinal worms they must be got rid of by suitable anthelmintic drugs. When the blood is watery and deficient in red globules, ferruginous tonics are the suitable remedies. In all instance, leeches and blisters, calomel and gray powder and antimony, merely serve to lessen the chances of recovery.

One important agent remains to be noticed, namely, the inhalation of the vapor of ether or chloroform; or, as I greatly prefer, of a mixture of the two. There are probably few practitioners who have seen much of the diseases of children that have not become impressed with the value of producing anæsthesia in those cases where the convulsive attacks follow each other in rapid succession. At the same time, I would not trust to anæsthesia alone, it being advisable, in the greater number of cases, to administer the bromide of potassium simultaneously.

3. ECLAMPSIA NUTANS.—Eclampsia nutans [from *Ἐκλάμπω* = to emit brilliant light; *Nuto* = to nod], or the "Salaam" convulsions of infancy, is an important but very rare malady—so rare that the majority of practitioners never see an example of it. The disease probably bears some

relation to both convulsions and paralysis agitans. Like epilepsy, from which it is distinguished by the absence of loss of consciousness, it may lead to impairment of the intellect. Thus, of four cases (the histories of which have been collected by Mr. Newnham*) two terminated in complete idiocy, and two in impairment of the intellect. The ages of the sufferers were 16 months, 4½ months, 12 months (?), and 6 months, respectively. Of two cases recorded by Dr. Faber of Wartenberg, one became epileptic with an imbecile appearance. Other instances are likewise known where either hemiplegia or paraplegia has been the unfortunate termination.

Symptoms.—The pathognomonic symptom by which this affection is distinguished—and which induced Sir Charles Clarke to denominate it "the Salaam" convulsion, is a peculiar and involuntary bowing backwards and forwards of the head, and occasionally of the body, the bowings being repeated in rapid succession, and the attacks coming on in paroxysms several times daily. The severe seizures appear usually to commence in the morning on awaking from the night's sleep. There is frequently headache, perhaps with a tendency to drowsiness, and the tongue may be coated. Squinting, with one or both eyes, is not uncommon. The bowels are usually sluggish, or even obstinately confined. Then, by and by, cerebral symptoms with general convulsions arise, or pure epilepsy; there may be hemiplegia or paraplegia, and the little patients pine and waste away. In more favorable cases, after the lapse of several months, the symptoms remit, and then at the end of two or three years the bodily health will be partially restored. The causes of this affection are involved in obscurity.

Pathology.—Mr. Newnham believed that the essential character of this malady is inflammatory action of a weak or strumous character. This probably commences in the membranes investing the medulla oblongata, and extends to those at the base of the brain. Hence, exudations of coagulable lymph or serum occur, which cause pressure, and consequently paralysis. The regular nutrition of the brain is also interrupted, and its manifestations blunted; while in the more aggravated cases the organ becomes so deteriorated as to lose all power of carrying on the intellectual functions, it having, in all probability, partaken of the same kind of inflammatory action as first appeared in its investing membranes.

Treatment.—The chief points to attend to are these: To see that the child is placed under the most favorable hygienic conditions; to keep the secretions in order by rhubarb and magnesia, or by mild doses of aloes, and at the same time to support the powers of life by bark, or by quinine combined with some preparation of steel. Cod-liver oil does good service. It may be well given with the so-called chemical food (F. 405). One case has been reported as cured by the use of blisters behind the ears, keeping the bowels regular with castor-oil, and the prolonged administration of iodide of potassium with quinine. In some of the other instances above referred to, hydrocyanic acid palliated the symptoms, while opium aggravated them. I do not know whether chloroform has been fairly tried. Bromide of potassium would probably be serviceable.

Tepid or cold bathing will be useful, especially at the seaside. Shower baths and cold affusions do harm. The diet must be nourishing, and should contain a free amount of fatty matters—especially milk. The body ought to be warmly clad, while the head is kept cool. All quick movements, and all harshness or anything which produces mental excitement, should be carefully avoided.

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* Clay's British Record of Obstetric Medicine and Surgery, vol. ii. Manchester, 1849.

4. ECLAMPSIA OF PREGNANCY AND PARTURITION.—Considering that this subject has been treated of somewhat fully in the section on Uræmia (p. 41), it will not be necessary to do more than supplement the remarks already made by a few notes. I shall offer these in the form of aphorisms, thus: (1.) The eclampsia of pregnant and parturient women is characterized by the sudden occurrence of violent tonic and clonic spasms, with complete loss of consciousness, the convulsive seizure ending in more or less profound stupor. Usually, the convulsions are general—they affect the whole body. Exceptionally, they are partial, perhaps involving only one-half of the body, consciousness remaining unimpaired. (2.) The attack commonly comes on for the first time during the last three months of pregnancy, and especially just as labor is commencing. It is from this latter circumstance that the disease is usually spoken of as "puerperal convulsions." (3.) Primiparæ are more liable to convulsions than multiparæ. (4.) The eclampsia is a symptom of blood poisoning from functional or organic disease of the kidneys; in either case, the renal affection being attended with albuminuria. (5.) According to my own experience, the occurrence of convulsions is more to be feared where the albuminuria is due to some unknown condition set up by pregnancy, and when it is therefore temporary, than where this state of urine is the consequence of old-standing structural disease of the kidney. (6.) The urine has generally been albuminous for some weeks previous to the convulsions, although a few cases are recorded where the albumen has only been found shortly after the first fit. The albumen being abundant in the urine, it may be taken for granted that the urea is proportionately scanty, so that as the blood becomes deficient in albumen its impurity gets greater. In addition to the albuminous state of the urine, the face and hands and arms will generally be found œdematous, or this condition may perhaps chiefly affect the feet and ankles, or the labia majora. (7.) When the fits once come on, they usually follow each other in rapid succession, being often repeated several times in the day, the patient being not only insensible during the paroxysm, but most frequently also in the interval. The duration of each fit, inclusive of the stage of convulsion and that of coma, varies from half an hour to two or three hours, or even longer. As the symptoms remit, consciousness returns very gradually; a confused dull headache being complained of, though there is no recollection of what has happened. (8.) Spontaneous premature labor is common in eclampsia; but it is quite exceptional for the child to be born alive, particularly after numerous paroxysms. (9.) The prognosis must always be guarded. From the statistics which I have collected, it is inferred that the mortality is at least thirty per cent. The termination is in recovery or death; protracted illness, as a result, being very rare, except where there has been renal disease prior to the pregnancy. When mischief is set up, it is mostly some form of paralysis or of mania. (10.) The principal remedies consist of the following: inhalation of chloroform, or of chloroform and pure ether mixed in equal proportions. Antispasmodic and purgative enemata. Large doses of bromide of potassium? The induction of labor, so as to empty the uterus speedily; the convulsions often cease, however, as soon as the liquor amnii is evacuated. When the attack occurs during the act of parturition the labor is to be expedited by turning or by the application of the forceps. On all grounds, I maintain that the employment of venesection, leeches, blisters, or mercury, is to be deprecated.

XIII. EPILEPSY.

Epilepsy [*Επιλαμβάνω* = to attack unexpectedly] is a complicated disease of the nervous system, which has attracted attention from the earliest times. The leading symptoms are, usually, sudden loss of consciousness and sensibility, with clonic spasms of the voluntary muscles, followed by exhaustion and coma, the attack varying in intensity and duration, and having a tendency to recur at intervals. The paroxysmal loss of consciousness is, however, the prominent or important element present in every instance, while not unfrequently it is the only one, there being no evident spasmodic movements of any kind.

Warnings.—There are sometimes, though not in the majority of cases, premonitory symptoms sufficient to warn the patient of an approaching seizure. These warnings differ both in character and the length of time they last. In some cases they are too short to allow the sufferer to dismount from horseback, or to get away from the fire, or even to lie down; while in other instances, many minutes, or even hours, elapse between their occurrence and the attack. Dr. Gregory, of Edinburgh, was assured by an epileptic that when a fit was approaching he fancied he saw a little old woman in a red cloak advance towards him and strike him a blow on the head, on which he at once lost all recollection and fell down. In a patient of my own, the fit is always preceded by rushing noises in the ears, which noises rapidly increase in intensity and velocity until they seem to come into collision. Directly this happens consciousness is lost. On one occasion there was an opportunity of testing the duration of these noises before evidence of the fit was given, and it was found to last two minutes and twenty seconds. Spectral illusions, headache, sickness, giddiness, dimness of vision, tremor or twitching, confusion of thought, a vague sense of fear and terror, and especially that peculiar blowing sensation known as the *aura epileptica*, constitute the most frequent premonitory symptoms. The epileptic aura is differently compared by patients to a stream of cold water, or a current of cold or warm air, or the creeping of an insect, the sensation commencing at the extremity of a limb, and more or less rapidly ascending along the skin towards the head. Directly the aura stops the paroxysm takes place.

Symptoms.—The commencement of a typical seizure is generally characterized by a cadaverous pallor of the countenance, and the utterance of either a loud piercing shriek or a kind of suppressed groan, immediately after which the individual falls to the ground senseless and violently convulsed. Hence the disease has been called by the vulgar the *falling sickness*, or more vaguely, *fits*. During the attack the convulsive movements continue violent. There is gnashing of the teeth, foaming at the mouth, and the tongue is thrust forward and often severely bitten; the eyes are partly open and suffused, the eyeballs rolling, and the pupils dilated and insensible to light; the pulse becomes feeble or it may remain natural, and the skin is generally cold and clammy. There may be involuntary defecation and micturition, with or without vomiting; the breathing is laborious or almost suspended, while the face gets flushed, and then livid and turgid. In fact, death seems about to take place from suffocation, when gradually these alarming phenomena subside, the extremities of one side are jerked about, and shortly afterwards all convulsive movements cease. The paroxysm leaves the epileptic insensible, and apparently in a sound sleep, from which he recovers exhausted and with slight mental confusion or headache, but without any knowledge of what he has just gone through. An attack of vomiting will sometimes follow the attack, while generally there is a

copious secretion of almost colorless urine, of low specific gravity, for many hours after the fit.

The average duration of the fit is three or five or eight minutes; it may, however, last for half an hour or more. The periods at which the seizures recur are variable. At first there is often a respite for three or four months; this time of freedom being perhaps followed by a bad day, on which as many as half a dozen fits may quickly succeed each other. Then as the disease progresses the intervals become shorter, lasting a week or two; until at length hardly a day passes without one or more paroxysms. In recent cases especially, the fits often take place in the night, either on just going to sleep or on awaking. The repetition of the seizures has a tendency to impair the memory, to weaken the understanding, and to produce a sense of mental depression or melancholy. Beyond these, no other consequences have been seen sufficiently often to enable any conclusion to be drawn as to the influence of epilepsy on the health. As will readily be imagined, various accidents are likely to occur from the epileptic falling into the fire, or into the water, or upon the sharp angles of furniture, &c.

The epileptic fit may be either severe or very slight, constituting the *grand mal* and the *petit mal* of the French. Instead of the severe well-marked phenomena just described there will perhaps be only a momentary loss of consciousness, so that the sufferer does not even stagger or fall (epileptic vertigo). For example, a child may be seized in the middle of its play, which it will resume immediately after the paroxysm, though probably slightly scared, there having been neither convulsion nor staggering; simply a sudden but complete blank lasting a few seconds. Such a seizure in an adult might be preceded by vertigo; so that he would be glad to hold some object, to which he would be fixed, as it were, during the attack. So again, with the scarcely more than momentary loss of consciousness, there may be twitchings of the muscles of the face and neck, dilatation of the pupils, and pallor of the countenance; succeeded by a dazed feeling, which the individual shakes off with one or two deep inspirations, and an exclamation of being "all right again." A lady under my care, whose fits at times recur twice a day, loses consciousness without falling, and often endeavors to strike any one near her; but she always tries, wherever she may be, to undress herself. In about five minutes there is recovery, as if from a dream.

The face of the epileptic frequently wears a peculiar expression which it is difficult to describe. In many cases there can be observed an immobility of the countenance—a sort of fixed state of the muscles, with a strange staring appearance about the eyes. The patient looks as if he were going to have a fit, though nothing of the kind happens. There is frequently also a dilated and sluggish condition of the pupil, with a want of brightness in the eye. In another class there appears to be a general torpid state of the system, with a disposition to suffer from frequent attacks of headache.

Epilepsy is now and then *feigned;* but the imposition may be detected by observing that the eyes are closed, the pupils contract to the stimulus of light, the skin is hot from the necessary exertion, the tongue is not bitten, and neither the urine nor fæces are voided. The foaming about the mouth is abundant; either because there is naturally plenty of saliva, or in consequence of a pellet of soap having been worked into a froth. The impostor also selects a time and situation for his manœuvres, when attention will be attracted to them. Proposing to apply the actual cautery, or to cut off the hair, will often effect a speedy cure; or an ingenious passer-by may blow some dry snuff up the nostril with a quill, and change the fit into one of

sneezing. One cunning rascal is reported to have worn over his chest, so that it attracted attention directly his coat was unbuttoned, a large card with this memorandum, "I must not be bled. A glass of hot brandy and water revives me."

Causes.—The tendency to epilepsy is often hereditary: probably in one-fourth of the cases that come under observation there can be traced a history of epilepsy, or of insanity, or of some marked disease of the nervous system in the parents or grandparents. The two sexes are equally liable to this disease. Malformations of the head are frequent predisposing causes. Perhaps infants whose heads have been greatly compressed during birth are more subject to epilepsy than others who have been brought into the world without the aid of forceps or extra violence. It is more common for the first attack to occur between the ages of twelve and twenty than at any other period; while in women at this time it is often accompanied by some derangement of the catamenia,—menorrhagia or dysmenorhœa, more frequently than amenorrhœa. Debauchery of all kinds, indulgence in alcoholic drinks, the practice of masturbation, &c., may give rise to it. Amongst other causes must be also mentioned fright, grief, blows upon the head, pregnancy, intestinal worms, and the irritation of teething. Poisoning of the blood in acute rheumatism or scarlet fever or diphtheria, and its impoverishment in renal disease, &c., may induce it.

Associated with epilepsy we often find dyspepsia, constipation, sleeplessness, great nervousness and depression, leucorrhœa in women, involuntary seminal discharges in men, &c., &c.

Morbid Anatomy and Pathology.—Uncomplicated epilepsy is so rarely fatal, that it is difficult to give precise information as to the appearances most commonly found, or to determine the value of the variety of lesions which have been discovered. When an epileptic dies who has only labored under the disease for a short time, no appreciable alteration of any part of the nervous system can, as a rule, be detected. If death occur during a paroxysm, the pia mater is often found more or less congested. In cases of long standing, disease of the cerebral bloodvessels, with softening or induration of the brain, may be present; while in such the weight of the brain is usually above the average. Occasionally the bones of the skull are thickened or otherwise diseased.

Dr. Todd held that the peculiar features of an epileptic seizure were due to the gradual collection of some morbid material in the blood; the accumulation going on until it reached such an amount as to act upon the brain in, so to speak, an explosive manner. Schroeder Van der Kolk concludes from his researches that the first cause of epilepsy consists in an exalted sensibility and excitability of the medulla oblongata, rendering this part liable to discharge its force in involuntary reflex movements, on the application of irritants which excite it. This irritation may be external (of the fifth pair of nerves), or it may be in the brain, or in the intestines. In children, intestinal worms and torpidity of the bowels are common causes; in adults, it may be due to irritation of the intestines, but especially to onanism. Amenorrhœa, chlorosis, congestion of the uterus, hysteria, &c., must also be remembered as causes. In the commencement there is only exalted sensibility, which may be removed and a cure effected; but when the disease becomes of long continuance, organic vascular dilatation takes place in the medulla, too much blood is supplied, and the ganglionic groups are too strongly irritated. Every attack increases the mischief by promoting the vascular dilatation. Moreover, increased exudation of albumen ensues from the constantly distended vessels; and the coats of these organs

get thickened, the medulla becomes hardened, and we have fatty degeneration, softening, &c.

The deaths registered as due to epilepsy, in England, for the year 1866, are $\frac{\text{Males } 1277}{\text{Females } 1191} = 2468$, which is about the average number for each of the last ten years.

Treatment.—This must have reference to the measures to be adopted during a fit, and those to be employed in the interval.

During the fit, the patient ought to be laid on a large bed, or on the floor, air is to be freely admitted around him, his head is to be raised, and his neckcloth (together with any tight parts of the dress) loosened. A piece of cork or soft wood should, if possible, be introduced between the teeth, to prevent injury to the tongue. Cold affusion to the head will sometimes be useful, especially where the countenance is turgid and congested; but generally speaking it is better to do nothing. With regard to those cases where the fit is preceded by the epileptic aura, the application of a ligature between the region from which the sensation starts and the trunk, has been said to prevent the attack. I know a lady who says she has a warning in the shape of a blowing sensation commencing at the fingers of the right hand. By getting somebody to grasp her arm very tightly just above the wrist, she escapes the fit for the time. On this principle the testicles have been removed or a limb amputated, when the aura has appeared to proceed from these parts; and although success seems once in a way to have followed, yet this practice would hardly be adopted in the present day.

In the interval we must endeavor to improve the patient's general health, and especially to give tone and firmness to the nervous system. Amongst those physicians who have recently paid attention to this disease, there are very few who do not agree in believing that everything tending to depress the vital powers does harm. Mineral tonics, especially quinine (F. 379, 386); or the salts of iron (F. 380, 390, 394, 405), or of zinc (F. 410, 413, 414), are consequently to be employed. Phosphorus is beneficial in some cases; the best preparation being the hypophosphite of soda (F. 419). There can be no doubt but that the bromide of potassium, in doses varying from ten to fifty or sixty grains thrice daily, is of remarkable efficacy in a large number of cases. Where it acts favorably, however, it seldom produces a radical cure; and I am inclined to think that most of the exceptions to this rule will be found in children. The bromide of potassium may certainly be continued for many months without injury, and perhaps for years. To gain any real amendment the remedy has generally to be given in full doses, while it must be steadily persevered with. Another drug which likewise acts as a valuable sedative in epilepsy is henbane. The good effect, however, has only persisted in my hands so long as the remedy has been regularly taken. A lady who has long been under my care, and who has suffered from severe epilepsy for many years, now passes from twelve to fourteen weeks without an attack, so long as she takes twelve fluid drachms of the tincture of henbane every night. This dose has, of course, only been gradually reached. She is not conscious of its producing any effect upon her system, beyond keeping off the fits.

The general health ought always to be attended to. The cold shower-bath may be recommended, if it can be well borne; otherwise the tepid sponging bath should be substituted. Care is to be taken that refreshing sleep is obtained; it will be advantageous for a mattress to be used, with a large firm pillow, so that the head may be high. The diet must be simple but nutritious, including animal food, milk, raw eggs, and a moderate quantity of wine or bitter ale. Cod-liver oil (F. 389) is often useful. The patient's habits must also be regulated by such rules as common sense will

dictate—daily exercise, early hours, quiet occupation at home, and attention to the alvine and urinary secretions being necessary, while excessive mental excitement or exertion is, on the other hand, especially contraindicated.

In some cases, those more particularly which are dependent upon a thickening of the cranial bones or membranes, iodide of potassium, or a gentle long-continued course of mercury, does good. Foville had great faith in the oil of turpentine in half-drachm doses, repeated every six hours, and Sir Thomas Watson seemed at one time to think it more useful than any other single drug. Camphor, valerian, assafœtida, naphtha, cajuput oil, and the various preparations of ether, are often very valuable adjuvants. The nitrate of silver long enjoyed great but undeserved reputation, while its tendency to blacken the skin ought to be sufficient to interdict its further employment. Again, the juice of the Cotyledon umbilicus has been much vaunted, but my own experience coincides with that of many practitioners who have tried it and found it valueless. The expressed juice of the Galium album or "ladies' bedstraw," has been said to act "with almost uniform success," an assertion which all physicians who have had much to do with epileptic patients can rightly interpret. Dr. Marshall Hall recommended strychnia in *tonic* not *stimulant* doses (F. 407, 408); while, following a suggestion of Dr. Todd's, I have used the vapor of chloroform, and believe that the fits have diminished both in severity and number from its employment. The truth probably is, however, as Esquirol shrewdly remarked, that epileptics improve for a time under every new plan of treatment. Undoubtedly, hope and confidence are important elements in the treatment of this disease, and the physician should therefore never appear to despond nor allow his patient to do so.

Dr. John Chapman, whose views have been already referred to (p. 366), gives the following directions for the cure of epilepsy. The object to be kept in view is to lessen the excito-motor power of the cord by diminishing the amount of blood circulating in it, and to prevent those spasmodic contractions of the cerebral arteries which induce the sudden loss of consciousness constituting the first phase of an epileptic fit. The rules are: (1.) Apply ice, in an india-rubber bag, to some one part, or to the whole length of the back, for from two to eighteen hours a day, according to the special character of the case under treatment. (2.) If the extremities be cold, their wonted warmth is to be restored by frequently immersing them in hot water and by friction during the first day or two of treatment. Also, in winter, by clothing the arms and legs in flannel. (3.) As auxiliaries, abundant physical exercise, use of dumb-bells when practicable, to arrange the dress and hair so as not to impart warmth to upper and back part of neck, promote mental activity by healthy study or some interesting employment, and to have the dress along the centre of the back light and cool. I am only personally acquainted with one patient who I believe was thoroughly treated on these principles; and in this case no benefit was derived. The experience of some other physicians is also very unfavorable to the practice. Dr. Chapman, however, has recorded instances in which he has been successful.

Mr. Tomes has published an instructive case that occurred in the Middlesex Hospital, where the derangement of the nervous system was due to diseased and exostosed teeth: "A lad, a farm-laborer from Windsor, was admitted into the hospital for epilepsy. The usual remedies were tried for six weeks without effect. His mouth was then examined, and the molar teeth of the lower jaw were found to be much decayed, and of some of these the fangs only remained. He did not complain of pain in the diseased teeth

or in the jaw. The decayed teeth were, however, removed, and the fangs of each were found to be enlarged and bulbous from exostosis. During the eighteen months that succeeded the removal of the diseased teeth, he had not suffered from a single fit, though for many weeks previous to the operation he had two or three per day. This is a case of singular interest, inasmuch as there was no complication of maladies, and hence there could be no doubt as to the cause of the disease, seeing that it immediately subsided when the teeth were removed."*

These remarks will hardly be complete without a brief notice of one or two other points. For example, Mr. Baker Brown has proposed the operation of clitoridectomy, as one calculated to effect a cure in a considerable proportion of epileptic women. The general voice of the profession has, however, been so strong in condemning this proceeding, that probably many years will elapse before it is again revived. Where these fits have been supposed to be due to masturbation in boys and young men, circumcision has been had recourse to. Supposing that the opening of the prepuce is so small that it cannot be drawn back for purposes of cleanliness, removal of the foreskin will be an unobjectionable measure; but whether any case can be shown where this proceeding has proved successful in curing epilepsy may be doubted. Dr. Marshall Hall entertained strong opinions as to the efficacy of tracheotomy in some forms of epilepsy, not so much as a curative proceeding, but to avert the dangers of the paroxysm, to convert the disease into a milder variety, and to give time for a trial of remedies.† Two or three cases have been recorded where this practice has been adopted, but probably no practitioner would now resort to it. Again, caustics to the larynx have been applied, though, as might be expected, without benefit. Compression of the carotids just before the fit may prevent it (see p. 408). Brown-Séquard cauterizes the nape of the neck, or the part where the aura originates, using the moxa or the red-hot iron; but I know not what amount of success has justified this treatment. And lastly, on the principle of attempting to relieve the congestion of the medulla oblongata, Schroeder Van der Kolk employs setons or issues placed high up in the neck. That counter-irritants over the upper cervical vertebræ, perhaps, with the administration of bromide of potassium or henbane, and the removal of all external sources of irritation, will often prove most useful, admits of no question.‡

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* A System of Dental Surgery, p. 443. London, 1859.

† Dr. Marshall Hall says: "There are two cases of epilepsy in its direst forms, in which the propriety and efficacy of tracheotomy admit of no doubt: these are, first, epilepsia laryngea, with spasmodic laryngismus, threatening the extinction of mind; second, epilepsia laryngea, with paralytic laryngismus, threatening the extinction of life. . . . . The diagnosis must be established by observing the state of the larynx, of the neck, of the face, and of the cerebrum. In the absence of laryngismus, the deep purple lividity and tumefaction, and the subsequent deep coma, &c., are equally absent, and tracheotomy of course *hors de propos*."—Lancet, pp. 308, 309, October 14th, 1854.

‡ In proof of this statement I may mention the case of a gentleman upwards of fifty years of age, who has been subject to epileptic fits for many years. To obtain relief he has consulted several physicians, and has taken large doses of bromide of potassium without any benefit. Under my advice he has half an ounce of tincture of henbane every night, and is provided with the blistering fluid of the British Pharmacopœia, to be used when necessary. His wife always knows when an attack is coming on, inasmuch as for a few hours before it occurs he speaks incoherently. Generally he rouses from his first sleep at about midnight. He wakes his wife, talks rubbish (knowing all the time that what he says is unintelligible, though he cannot help saying it and cannot give any explanation), goes to sleep again, and then in the course of the night has a severe fit. But since he has been under my care, his wife applies the blistering fluid freely to the back of his neck, directly he wakes in

XIV. HYSTERIA.

Dr. Copland defines hysteria thus: "Nervous disorder often assuming the most varied forms, but commonly presenting a paroxysmal character; the attacks usually commencing with a flow of limpid urine, with uneasiness or irregular motions and rumbling noises in the left iliac region, or the sensation of a ball (*globus hystericus*) rising upwards to the throat, frequently attended by a feeling of suffocation, and sometimes with convulsions; chiefly affecting females from the period of puberty to the decline of life, and principally those possessing great susceptibility of the nervous system, and of mental emotion."*

I shall consider this disease as it occurs in paroxysms, as it affects sensibility, and as it mimics other affections. The name hysteria [Ὑστέρα = the womb] has been applied to it, owing to its supposed origin in the uterus. The term is inappropriate, on several grounds; but particularly so since the disease is not necessarily connected with any derangement of the female sexual system, while it is occasionally seen in the male sex.

Causes.—There is no one prominent circumstance which can be brought forward as a cause of hysteria. Disturbed cerebral nutrition may be said to be its foundation; using the word "nutrition" in its broadest sense, and considering the proper performance of this function to involve the healthy action of every organ in the body. Sex, celibacy, and age, influence the origin of this disease.

Females are greatly more predisposed to all forms of hysteria than males. This is said to be due to *the greater susceptibility of the nervous system* in women; a vague phrase, however, having more sound than meaning. With a much greater show of reason I think it may be suggested that the explanation lies in the different way in which the two sexes are trained and educated. The disease usually begins about the time of puberty: in about 70 per cent. the first manifestation of it will be found to happen during the decade of 16 to 25 years. Single women suffer more frequently than married: among the latter, those who do not become pregnant are most susceptible to it. Hysteria is almost unknown among prostitutes; and hence it must be inferred that excessive sexual intercourse has no influence as an exciting cause. There can be little question but that want of occupation has a very injurious effect upon both mind and body, and that one of these effects is the production of the hysteric condition. Disappointment and vexation, especially if these emotions are called into play by "love affairs," are active causes of this disorder. Examining my numerous notes of cases of hysteria which have accumulated during twenty years, I cannot learn that there is any relationship between the development of this disease and the occurrence of amenorrhœa, dysmenorrhœa, or menorrhagia. There is often some disturbance of the uterine functions, but not of one kind more frequently than another.

With regard to males the disease has seemed due in the instances which have come under my own observation to mental overwork, to an unwise

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the semi-delirious state; and now, on almost every occasion, the seizure is prevented. From frequent observation this lady feels certain that the counter-irritant has a most decidedly valuable effect. She thinks the tincture of henbane alone has diminished the number of the attacks, but with this and the blister she feels almost sure of warding them off. The sore neck tells the patient in the morning what has happened during the night. He has no recollection, however, of having been awake.

* Dictionary of Practical Medicine; article "Hysteria," vol. ii, p. 272. London, 1858.

curtailment of the hours for sleep, to all kinds of dissipation, or the influence of long-continued anxiety or grief. Hereditary tendency to nervous disorders may have existed.

Symptoms.—The symptoms which characterize the *hysteric paroxysm* or fit are, convulsive movements of the trunk and limbs; violent beating of the breasts with the hands clenched, and tearing of the hair or of the garments; together with shrieks and screams, violent agitation and the globus hystericus. The attack ends with tears, convulsive outbreaks of crying or laughter, and sometimes with obstinate hiccup. Occasionally, the patient sinks to the ground insensible and exhausted: she remains so for a short time; and then recovers, tired and crying. The fit is often followed by the expulsion of a quantity of limpid urine; while occasionally this secretion is passed involuntarily during the tumult.

The paroxysm differs from epilepsy, inasmuch as the hysteric fit is almost peculiar to women, it continues longer, the pupils are not affected, and there is seldom loss of consciousness—the patient being aware of all that is passing around her. The convulsive movements are also of a different character, much noisier though in reality less severe, and not more marked on one side of the body than the other. Moreover, the respirations are never suspended; the tongue is not bitten; and the attack is not followed by coma, as epilepsy is.

It has been well pointed out by M. Briquet that hysterical patients frequently suffer from *hyperæsthesia* or increased sensibility of various tissues. The fleshy portions of the muscles are very liable to become so affected. This is particularly the case with the muscles of the frontal and temporal regions of the cranium; with those of the epigastric region, often in association with dyspepsia; with those of the back, especially on the lower part and left side of the vertebral column, sometimes leading to the erroneous opinion that there is spinal disease; with those of the side of the thorax, especially the left, giving rise to symptoms likely to be confounded with the suffering produced by pleurisy or intercostal neuralgia; also with those of the walls of the abdomen, the pain of which can hardly be mistaken for that of metritis or ovaritis if its superficial character be observed; and, lastly, with the superficial and perhaps the deepseated muscles of the upper and lower extremities. The pain is generally aggravated by pressure, by movement, by moral emotion, and by even a mild electric current; while it is relieved by resting the affected muscles. Moreover, it varies in intensity from mere uneasiness causing slight inconvenience, to the most acute suffering destroying all repose and inducing fever with general disturbance; and it is generally accompanied by weakness and mental depression. There is none of the heat, redness, tension, or pulsation of inflammation; and the pain may disappear for a time, soon to return in an aggravated form, and to prove very rebellious to all kinds of treatment.

The opposite condition of *anæsthesia*, or loss of sensibility, is a prominent phenomenon in some instances; and it is probable that nervous women and magnetic somnambulists, whose insensibility is supposed to be a trick, are often merely hysterical women thus affected. The anæsthesia may be only temporary, or it may last for years; the skin being most commonly affected. The left side of the body also suffers more often than the right; while the conjunctiva is frequently insensible, especially that of the left eye. The muscles of the extremities may be rendered so devoid of sensibility that pins and needles can be thrust into their substance without causing the least manifestation of pain.

In some chlorotic and hysterical subjects the appetite for food is much diseased, and the most improper and indigestible substances will be taken

Occasionally, the appetite is preternaturally diminished; and weak girls, wishing to make themselves objects of pity and wonder, will pretend to subsist without any nourishment at all. Allied to these cases are those where young women thrust needles into various parts of their bodies, or produce ulcers by pressure, or pass various substances into the vagina, or resort to other means to excite the compassion of their relatives.

Although *hysteria may simulate almost every disease* in our nosology, yet there are certain favorite maladies for imitation. The most common seem to be,—suppression of urine, calculus of the bladder, inflammation of the peritoneum, pleurisy, consumption, laryngitis, stricture of the œsophagus, aphonia or loss of voice, paralysis, and disease of the spine or of one or more of the joints. Hysterical cough, dyspnœa, sneezing, yawning, panting, sighing, sobbing, or wearying hiccup may be continuous for hours, or even days; until, indeed, considerable exhaustion sets in. In all forms, the individual deceives herself and tries by strong expressions of suffering to mislead others. A practiced eye is seldom, however, long imposed upon by such patients; although undoubtedly cases are met with, and especially among the upper classes of society, where the diagnosis is surrounded with difficulty. There is a peculiar expression about hysterical women impossible almost to define, yet readily recognized when once it has been studied. Moreover, there is a fulness of the upper lip, and a tendency to drooping of the upper eyelids; the self-tormentors answer questions in an unpleasant manner, often only in whispers and monosyllables; and their pains are always said to be most acute, and to be increased by pressure, or almost even by pretended pressure. The catamenia are generally irregular, and there is frequently profuse leucorrhœa.

And here the important question may be asked: Are these pains and sufferings, described as being so acute, simply feigned? Is the patient merely playing at disease or shamming? There can be no hesitation in replying: Undoubtedly not. Of course, exceptions to this rule are to be met with; but, speaking generally, the hysterical woman believes herself to be grievously afflicted. Her sensibility is undoubtedly altered, perhaps exalted, perhaps depressed. Her will for good ends seems almost powerless, and only to be roused by some strong emotion. The intelligence is much more commonly above than below that of average women, while often there is great ability and acuteness. Yet with all this, many valuable years may be wasted, owing to a long series of morbid feelings. Sir Henry Holland has well observed that the hypochondriac, by fixing his consciousness with morbid intentness on different organs, not merely creates disordered sensations in them, but even disordered actions. Examples of such can easily be called to mind. Thus there may be palpitation of the heart, hurried or choked respiration, flatulence, and other diseases of the stomach, irritation of the bladder, and vague neuralgic pains, all arising from this morbid direction of attention to the organs in question. It is also certain that many of the secretions are immediately affected by mental emotions; and the same results ensue from simple sustained attention to the parts concerned in these functions.

Under the name of "The Bed Case," Dr. Walter Channing has described a peculiar affection which I cannot but regard as a not uncommon form of hysteria.* The subjects of it live in bed; they are tranquil, cheerful, have good digestions, and like the kind attentions showered upon them by sympathizing friends. They are often firmly impressed with the belief that there is serious disease in the spine, or in the womb; and there are gener-

* Bed Case: its History and Treatment. Boston, 1860.

ally certain movements which they think cannot be made without "horrible" pain. Menstruation is frequently attended with suffering, and there is vaginal or uterine leucorrhœa. Amongst the seven or eight examples of this pseudo-disease which have come under my observation, the most marked was that of a single lady, thirty-four years of age, who first consulted me in 1861. This patient had then been confined to her room, and almost to her bed, for ten years. She had been treated for spinal disease by some practitioners, and for irritable uterus by others. Of course, she had taken large quantities of medicine; while leeches, blisters, setons, &c., had been freely used. The recumbent posture had been maintained because of the pain (it was said to be "agony") caused by sitting up, and not for any supposed paralytic condition. On examination I found every part of her body healthy with the exception of the uterus, which was retroflexed. By replacing this organ, and by the use of galvanism to the long inactive muscles, a cure was effected; but the greatest patience was needed to get her from her bed to the sofa, from the sofa to the chair, from the chair to crutches, and so on until at the end of three months she could walk out in the open air. Some of these cases can be cured in a much shorter time; so that every now and then the public is gratified by hearing of some wonderful empiric, who has restored a case of paralysis to health simply by the command—"Rise up and walk." As, however, each example of hysteria varies in regard to important mental peculiarities, so there is no one remedy applicable to all. Frequently, too, caution is needed lest the patient should determine not to get well.*

* The reader will find a good example of this variety of hysteria in Mrs. Oliphant's Life of Edward Irving, vol. ii, Appendix A. London, 1862. The patient describes her cure in a letter to a friend, the principal points in which are the following. She says: "My dear Christian Friend,—I received yours of the 22d on Friday last, and take up my pen with pleasure to inform you of the particulars of the Lord's gracious dealings with me. . . . . I transcribe you a copy of facts, which by the wish of my dearest Father I have written out for the perusal of our Christian friends: it is a plain detail of facts from the commencement of my illness. In the month of November, 1822, having for some months been in a bad state of health, it pleased God to visit me with a hip disease. Perfect rest was recommended by the late Mr. Pearson of Golden Square. . . . . This was the last application; and in September, 1828, I returned home as unable to walk as when leaving: once or twice the attempt was made, but produced much pain. From this time no means have been used excepting constant confinement to the couch. Within these few weeks, even on the very day in which Jesus so manifested His Almighty power, I had attempted to walk; scarcely could I put one foot before the other, the limbs trembled very much. Thus it continued till October 20th, 1830, when a kind friend, who had seen me about two months before, had been led by God to pray earnestly for my recovery. . . . . Sitting near me, we talked of his relatives and of the death of his brother. . . . . After asking some questions respecting the disease, he added, 'It is melancholy to see a person so constantly confined.' I answered, 'It is sent in mercy.' 'Do you think so? Do you think the same mercy could restore you?' God gave me faith, and I answered, 'Yes.' 'Do you believe Jesus could heal, as in old times?' 'Yes.' 'Do you believe that it is only unbelief that prevents it?' 'Yes.' 'Do you believe that Jesus could heal you at this very time?' 'Yes.' (Between these questions he was evidently engaged in prayer.) '*Then*,' he added, 'get up and walk to your family.' He then had hold of my hand. He prayed to God to glorify the name of Jesus. I rose from my couch quite strong. God took away all my pains, and we walked down stairs. Dear Mr. G. prayed most fervently, 'Lord have mercy upon us! Christ have mercy upon us!' Having been down a short time, finding my handkerchief left on the couch, taking the candle I fetched it. The next day I walked more than a quarter of a mile, and on Sunday from the Episcopal Jew's Chapel, a distance of one mile and a quarter. . . . . It is material to add that my legs, the flesh of which was loose and flabby, feeling them in a short time after I walked down, were firm as those of a person in full health. The back, which was curved, is now perfectly straight. My collar-bones have been pronounced by a

Treatment.—During a paroxysm the patient's dress is to be loosened; she must be prevented from injuring herself; and she should be surrounded by cool air. Smelling-salts may also be applied to the nostrils; while if she can swallow, a draught containing a drachm of the ammoniated tincture of valerian, or of the fetid spirit of ammonia, can frequently be administered with benefit. When the apparent insensibility continues, the sudden and free application of cold water to the head and face will probably cut it short. Many a "fit-case," carried into the hospital on a stretcher, may have the use of her limbs (and the tongue also) immediately restored by holding her head under the water-tap for a few seconds.

In the other forms of hysteria the general health must be attended to, the bowels kept freely open, the plunge or sponge or shower-bath daily used, and ferruginous tonics administered where there is a state of anæmia. When the catamenia are unnatural, the treatment must have reference to the nature of the particular disorder. Thus, if too abundant, astringents and the cold hip-bath, to the water of which alum or bay-salt should be added, ought to be employed; if scanty, the flow should be encouraged by aloetic purgatives, different preparations of iron with small doses of strychnia, and the warm bath. The compound decoction of aloes and the compound iron mixture—half an ounce of each—taken twice or thrice daily, will form an excellent medicine in such cases; especially if a pill made of four grains of the compound assafœtida pill and a quarter of a grain of extract of nux vomica, be given with each dose. For hysterical aphonia, galvanism is often very useful. A mild induced current of galvanic electricity should be applied by means of moistened conductors, the poles being directed partially to the inferior laryngeal nerve and partially over the crico-thyroid muscle, since it plays an important part in the formation of the voice. In hyperæsthesia of the muscles, hot cataplasms, iodine liniment, warm baths, and a mild electric current, are the means to be tried, while in anæsthesia a cure can often be effected by making a stronger current of electricity traverse the insensible muscles daily for some ten or fifteen minutes at a time. As in other cases of hysteria, so in these varieties, one or more of the preparations of assafœtida (F. 86, 89), of valerian (F. 87, 93), of zinc (F. 410), of quinine (F. 379, 411), of steel (F. 380, 394, 401), or of phosphorus (F. 405, 417, 419), &c., will every now and then be found serviceable. But it is a great mistake, on the other hand, to prescribe nauseous drugs as a matter of routine. In many instances more good will be done without than with physic, provided the physician is sufficiently painstaking, and has sufficient sympathy with his patient to try and guide her aright.

The patient's diet should be regulated; nourishing food being necessary, milk or cocoa displacing tea and coffee, and often a moderate quantity of wine or beer being allowed. Hot rooms and evening parties are to be proscribed; stays can sometimes be advantageously dispensed with, the spinal muscles being strengthened by bathing and friction, while daily exercise is to be taken in the open air. And then, lastly, it is of the greatest importance that while the value of self-control is inculcated, healthy mental occupa-

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surgeon to be in quite a natural state, whereas one of them was before much enlarged. I must tell you that my mind had not been at all occupied with those events which had taken place in Scotland; indeed, all I had heard concerning them was that a young person had been restored in answer to prayer; this was, perhaps, five or six months back. I had heard of nothing since, and can with truth say my mind has never been led to the contemplation of such subjects. I had not the least idea that my dear friend was offering up prayer in my behalf, for he did not say so till after the mighty work was wrought. . . . . ELIZABETH FANCOURT."

tion and recreation should be afforded. Indeed, without these latter, a permanent cure is not to be expected, for amongst the most frequent causes of hysterical affections we must count the want of proper employment for the mind and bodily energy.

XV. CATALEPSY.—ECSTASY.

These wonderful diseases are very rare, but they undoubtedly do happen occasionally. Nervous and hysterical women are most likely to suffer from them. They are not dangerous, although repeated attacks impair the intellect. They more frequently have their origin in strong mental emotion than from any other source.

By a fit of *catalepsy* [*Καταλαμβάνω* = to restrain, or hold firmly], is implied a more or less complete suppression of sensation and volition, the patient remaining rigid during the attack, and in the same position in which she happens to be at the commencement, or in which she may be placed during its continuance. The seizure may last only a few minutes, or several hours, or even one or two days. On recovery, which is generally instantaneous and as if from a deep sleep, there may be momentary surprise and embarrassment, but no recollection of what has occurred. Very rarely these cases terminate in apoplexy or insanity, or they may be connected with chronic softening or with tumor of the brain.

"Absence of mind" is a slight form of catalepsy. Dr. Laycock well remarks, that "in *brown study* or reverie, the eye is fixed by a muscular action analogous to the cataleptic; and not the eye only, for a limb, or the whole body, will remain in the same position for many minutes, the senses themselves being in deep abstraction from surrounding objects."* With some individuals a cataleptic state may be induced by strongly fixing the attention on one object for a short time. The mental faculties get tired; there is diminished nervous influence or force, and persons so affected then believe that they are unable to move, cannot see, &c., until the so-called *mesmerizer* grants them permission. Examples of this state are also seen in animals,—as in birds and rabbits *fascinated* by the glaring eyes of the serpent.

Owing to the deathlike condition which this disease may produce, cataleptics have been buried alive. Such an occurrence is scarcely likely to occur in our own country, where an interval of five or six days is allowed to elapse between death and interment.

An interesting report of a well-marked case of catalepsy, which was admitted into St. George's Hospital, has been published by Mr. Thomas Jones.† The patient was a male, aged 60, who for a fortnight had experienced much mental suffering owing to the sudden death of his wife. He was always very excitable, but his previous health had been good. Two or three days before the attack there were hallucinations of vision and hearing. Then, while engaged in plastering, he became suddenly seized with tetanic rigidity of all the muscles, which caused him to be fixed in the position he was in at the moment. Subsequently the limbs retained any position in which they were placed; there was partial loss of consciousness, and the duration of the fit was twenty-two hours. The recovery was good.

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* A Treatise on the Nervous Diseases of Women, p. 316. London, 1840.

† British Medical Journal, p. 585. June 6th, 1868.

An account of an endemic cataleptic disorder prevalent at Billinghausen, near Würzburg, has been published by Dr. Vogt.* The population consists of 356 individuals, who are Protestants although living among Catholic neighbors. They are small, feeble, and plain-featured. "There is no poverty—the poorest man in the place is the minister." About half the inhabitants, males as well as females, are affected; being known as the *starren* (stiffened ones). Without any premonitory symptoms, the patient suddenly falls down. The aspect becomes deathlike, the face pale, the eyes fixedly directed to one point with their axes converging, the lips closed and protruded, and the fingers semiflexed. Attempts to speak result in short and unintelligible sounds. The muscular system is alone affected; the senses and intellect remain uninterfered with. The attack lasts from one to five minutes; and its occurrence appears to be favored by cold. The long-prevailing system of intermarriages may be the cause.

Such of the Abyssinian unmarried women as lead dissolute and irregular lives are said to be especially liable to two diseases—the *Bouda* and *Zar*. The former shows itself by a series of severe paroxysms of a cataleptic character. The latter is evidently a variety of hysteria; and according to the Rev. H. A. Stern it has this peculiar feature, that during the violence of the attack the patient imitates the sharp and discordant growl of the leopard. "To expel the *Zar*, a conjuror, as in the *Bouda* complaint, was formerly considered indispensable; but by dint of perseverance, the medical faculty of the country, to their infinite satisfaction, have at length made the happy discovery that a sound application of the whip is quite as potent an antidote against this evil as the necromancer's spell."†

In what is termed *ecstasy* [Ἔκστασις, from Ἐξίστημι = to put a person out of his natural state] the condition is of an analogous kind. The patient is insensible to all external impressions, but is absorbed in the contemplation of some imaginary object. The eyes are immovably fixed; but impassioned sentences, fervent prayers, psalms and hymns are uttered or sung with great expression. The religious fanatic, by encouraging some predominant idea, falls into a state resembling the incipient stage of monomania. The "gift of unknown tongues" was mostly manifested by nervous women; who were not impostors, but simply diseased. Faith, imagination, perverted religious enthusiasm, erotic excitement, and an irresistible propensity to imitation, will explain the case of the convulsionaries of St. Medard over the grave of the Abbé Pâris. And so also with the victims of tarantism, the dancing mania, &c.

A similar plan of *treatment* to that recommended in hysteria must be relied upon for the repression of these emotional disorders. Remembering that most kinds of enthusiasm are contagious, it is usually advisable to isolate those that are afflicted. This advice should be particularly acted upon in the case of young persons at school.

XVI. CHOREA.

Chorea [Χορεία = a dancing or jumping; from Χορὸς = a dance accompanied with singing], or St. Vitus's dance, is characterized by irregular, tremulous, and often ludicrous actions of the voluntary muscles, especially

* Würzburger Medicinische Zeitschrift, Band iv. p. 163. 1863. Half-Yearly Abstract of the Medical Sciences, vol. xxxix, p. 81. London, 1864.

† Wanderings among the Falashas in Abyssinia, p. 160. By the Rev. Henry A. Stern. London, 1862.

of those of the face and limbs; there being incomplete subserviency of the muscles of this class to the will. In consequence of these jerking movements the disease has been quaintly designated "insanity of the muscles."

Causes, &c.—Chorea may last from one week to several months; the average duration in uncomplicated cases, under the use of tonics and good food, being about four weeks. It is often complicated with hysteria. The general health is usually below the normal standard from the commencement; while it deteriorates more and more as the disease gains ground. Fright appears to be the most frequent cause; blows or falls seem sometimes to have induced it; and the occurrence of the disease from irregular dentition, or from the irritation of intestinal worms, has long been noticed. It has by some, moreover, been attributed to onanism; while deranged uterine function is occasionally the apparent cause. Some of the worst cases that have been recorded have occurred during gestation, especially in women pregnant for the first time. I believe, too, that the children of nervous and hysterical women are more likely to be afflicted by it than others. Although most common in girls, yet boys from eight to sixteen years old not unfrequently suffer from it. The deaths from chorea registered in England in 1866 were $\frac{\text{Males } 20}{\text{Females } 43} = 63$; of which number 36 were above five years of age and under twenty.

Symptoms.—This disorder occurs most frequently in young girls between the age of six and sixteen; while it may be either of a mild or severe type. It begins generally with occasional clonic spasms of the muscles of the face; which somewhat distort the features so that the child seems to be making slight grimaces for fun or mischief. By degrees, all or almost all the voluntary muscles become affected. The child finds it almost impossible to keep quiet, though the movements are to some extent under the control of the will; while there is a constant restlessness of the hands and arms, and even of the legs. One half of the body is generally more affected than the other; while in a few cases the movements are entirely confined to one side —*hemichorea*. Moreover, the twistings and contortions of the features become more constant and distressing; the articulation gets impeded, so that the speech is indistinct; while all the shifting motions are most severe when the child is conscious of being watched. If the patient be asked to put out her tongue, she is unable to do so for some moments; but at last suddenly thrusts it out, and as suddenly withdraws it. If she be told to walk, she advances in a jumping manner, by fits and starts, dragging her leg rather than lifting it, and alternately halting and hopping. She cannot even sit still: her shoulders writhe about, she picks her dress, and shuffles or scrapes the floor with her feet. During sleep these irregular actions almost invariably cease. The disease must be present in a very severe form indeed, for it to prove an exception to this rule. All the time these symptoms are steadily progressing, the general health fails. The circulation becomes languid, as is evidenced by the cold hands and feet, and the liability to chilblains; while the blood gets poor, as is shown by the pallor of the surface, and the puffiness about the ankles.

Supposing this disorder runs its course still further, endocarditis or pericarditis may supervene. Sometimes there is merely functional disturbance of the heart, with an anæmic murmur audible at the base. In other instances a loud bruit is detected at the apex, the origin of which has by several observers been thought to be due to choreic contraction of the musculi papillares, causing valvular imperfection and regurgitation. This explanation, if correct, which it probably is not, can only apply to some cases, since the murmur not unfrequently remains permanent.

When an attack of chorea is of long continuance, the memory gets impaired and the temper irritable, while often the countenance assumes a vacant appearance bordering on fatuity, and some imbecility of mind becomes manifest. The functions of the stomach and bowels are also frequently deranged, the appetite is irregular, the abdomen is swollen and hard, and there is often constipation. The urine is of high specific gravity, especially when the choreic movements are very active, a condition due, according to Dr. Todd, to the increased waste of tissue consequent on the disturbed state of the muscles and nerves. There is also very commonly an excess of urates, while now and then sugar has been detected. As the case gradually improves, the specific gravity of the urine diminishes. Moreover, all the symptoms cease on the termination of the disease, which is seldom fatal or even dangerous, unless it merges into organic disease of the nervous centres, or of the heart, or into epilepsy.

Pathology.—As the appearances found after death are usually slight and by no means uniform, physicians have not agreed as to the pathology of chorea. Several observers regard it as a disease, the essence of which is perverted nervous function. Others believe that the blood is primarily affected. There seems to be some obscure connection between chorea and rheumatism, the latter disorder occasionally preceding the former, now and then accompanying it, sometimes following it, and perhaps even alternating with it. Numerous cases have been recorded in which morbid conditions of the heart and pericardium, of a rheumatic as well as of a non-rheumatic character, have given rise to choreic symptoms. Hence the latter have been supposed, by some authorities, to be produced through the irritation of the spinal cord by minute embolic particles which have been washed off the valves of a rheumatic heart. According to Dr. Hughlings Jackson it is probable that chorea occurs frequently from embolism of the minute vessels supplying the corpus striatum and neighboring convolutions, the mechanical interference with the blood-supply causing an excitable ill-nourished nerve-tissue. In some instances of fatal chorea the brain has been found congested; in others there has been serous effusion under the arachnoid and into the ventricles; while in others again, a softened state of a portion of the brain, or of the spinal cord, or of both, has been detected. Moreover, occasionally the disorder would seem to have been connected with symptoms of mental imbecility.

Treatment.—When medical treatment is called for, the only plan to be recommended consists in regulating the bowels, subduing irritation, and strengthening the system. For this purpose, the employment of cathartics of a stimulating nature is usually necessary, such as calomel and jalap; or, where worms are suspected, the oil of turpentine. A combination of tonic or antispasmodic medicines with purgatives, is often found to be serviceable. The three great remedies, however, are the tepid shower or douche bath, steel, and plenty of good nourishing food. As regards the bath, it should be employed every morning on the patient's rising, the temperature of the water varying with the season and the reaction produced. Occasionally, a warm sulphur bath, three or four times a week, is to be preferred to the foregoing. With respect to the steel, different preparations have been recommended. Perhaps one of the best is the saccharated carbonate of iron, given in doses varying from five to twenty grains, mixed with treacle. The syrup of the iodide, or the ammonio-citrate, or the tincture of the perchloride of iron may, however, be used almost as advantageously. The combination of steel and arsenic (F. 399), or of steel and zinc (F. 414), or of steel and phos-

phate of lime, &c. (Chemical Food, F. 405), is to be preferred in some cases, especially in such as are of a severe and obstinate character. Cod-liver oil is generally useful, administered simultaneously with tonics. Arsenic alone will sometimes effect a cure where steel fails (F. 52), and so will the sulphate or phosphate of zinc. I have likewise found much benefit in certain well-marked cases from the hyphophosphite of soda or lime with bark (F. 419). The diet must be nutritious, with plenty of milk, and a proper allowance of claret, or port, or tokay, or beer; exercise in the fresh air is to be freely allowed; and while amusement or occupation does good, yet mental excitement ought to be guarded against.

Where the choreic movements are so violent as to be the cause of exhaustion and continued sleeplessness, the aspect of affairs gets more alarming. Under these circumstances, opium is useless. It may be given until the pupils are contracted to the size of a pin's point, without lessening the irregular movements. Indeed, some of the most violent cases I have seen, have been those where this drug has been employed. The action of henbane is sometimes favorable, provided it be given in sufficient doses (from two fluid drachms to half an ounce of the tincture, for adults). Belladonna does good, particularly in combination with the henbane. Conium is also a valuable remedy; the officinal juice being the best preparation. The extract of Calabar bean in doses varying from $\frac{1}{16}$ to $\frac{1}{4}$ grain, every three or four hours, may be tried. These failing, the patient had better be put to sleep by some anæsthetic; a mixture of pure chloroform and ether (F. 313) being decidedly the best. The sleep will often be prolonged and rendered more refreshing by giving from ten to forty or sixty minims of the spirit of ether, in camphor-water, by the mouth, just before the inhalation.

A choreic child should hardly be allowed to mix very freely with other children. For in the first place, it is cruel to expose the infirmity; and secondly, the effects of the principle of imitation are so remarkable in the young, that the disease may spread to the healthy. Falstaff's words have a wider application then he intended. "It is certain," says Sir John, "that either wise bearing, or ignorant carriage, is caught, as men take diseases, one of another; therefore, let men take heed of their company."

The employment of gymnastic exercises has been strongly recommended. In a memoir submitted to the French Academy of Sciences, M. Blache states, that he has treated by these exercises alone, or by these in combination with other measures, such as sulphur baths, 108 patients—84 girls and 24 boys. In 102 the cure was completed, on an average, in 39 days; in the remaining 6, in 122 days. These figures prove very little; inasmuch as numerous cases can be cured in five or six weeks by moral control and nourishing food, without any other treatment whatever. Nevertheless, a system of gymnastics or of drilling may often be made supplementary to the tonic and other remedies with considerable advantage.

When chorea occurs during pregnancy it is sometimes so violent (especially in primiparous women) that the intellect becomes affected and the patient's life greatly endangered. To preserve the latter it may be necessary to induce abortion; taking care not to postpone this proceeding until the exhaustion is so great as to allow of little hope of restoration.

XVII. TETANUS.

The term Tetanus [*Τείνω* = to bend, or strain] is used to denote an acute disease, the principal feature of which is a long-continued and painful contraction or spasm of a certain number of the voluntary muscles. The rigidity of the muscles being continuous, we say that there is *tonic spasm* or *spastic contraction;* these terms being employed in contradistinction to the *clonic spasms* of convulsions, in which there is a state of alternate contraction and relaxation.

The *causes* of tetanus are chiefly exposure to cold and damp, and bodily injuries—particularly lacerated wounds. Foreign bodies in wounds, such as bullets, &c., pus confined under fasciæ, and sudden vicissitudes of temperature, are powerful causes. When due to cold, or when arising spontaneously, it is termed *idiopathic;* when the result of wounds, *traumatic* tetanus. In idiopathic tetanus recovery may be hoped for; while in the traumatic form almost every case proves fatal. Taking both varieties into the calculation, it may be said that death is most likely to occur between the third and fifth days of the disease.

During the late American war the cases of traumatic tetanus which occurred look rather numerous in proportion to the total number of the wounded. On the registers, revised up to September 30th, 1865, it is shown that there are included 363 examples of tetanus in 87,822 cases of gunshot wounds and other injuries.* Of the 363 reported cases, 336 ended fatally; while the disease was of a chronic form in 23 out of the 27 recoveries. The majority of the patients were treated by the free use of opium, with stimulants and concentrated nourishment. Chloroform inhalations, subcutaneous injections of morphia and atropia, cathartics, quinine, cannabis indica, bromide of potassium, strychnia, belladonna, aconite, blisters, ice to the spine, and turpentine stupes, were also among the remedies employed. The value of nicotin, curara, and the Calabar bean was not tested. This is to be regretted, as according to Demme, out of 22 cases of traumatic tetanus treated by curara 8 recovered.

The *symptoms* usually set in suddenly, the muscles of the jaws and throat being commonly the first affected. The patient complains that he has taken cold, and says that he feels as if he had got a sore throat and stiff neck; but the stiffness and uneasiness soon increase, and extend to the root of the tongue, causing difficulty in swallowing. The temporal and masseter muscles gradually get involved, and *locked-jaw* or *trismus* [*Τρίζω* = to gnash with the teeth] occurs. When the disease proceeds, the remaining muscles of the face, those of the trunk, and lastly those of the extremities, become implicated. The spasm never entirely ceases, except in some cases during sleep; but it is aggravated every quarter of an hour or so, the increased cramp lasting for a few minutes, and then partially subsiding. Where the strong muscles of the back are most affected, they bend the body into the shape of an arch, so that the patient rests upon his head and heels, a condition known as *opisthotonos* [*Ὀπισθε* = backwards + *τείνω* = to bend]. When, on the contrary, the body is bent forwards by the strong contraction of the muscles of the neck and abdomen, the affection is termed *emprosthotonos* [*Ἐμπροσθεν* = forwards + *τείνω*]. Again, if the muscles are affected laterally, so that the body is curved sideways, this state has been

* Reports on the Extent and Nature of the Materials available for the preparation of a Medical and Surgical History of the Rebellion. Circular No. 6, pp. 6 and 41. Philadelphia, 1865.

designated *pleurosthotonos* [*Πλευρόθεν* = from the side + *τείνω*], or *tetanus lateralis*. The symptoms produced by a poisonous dose of strychnia resemble those caused by tetanus.

The suffering caused by the tetanic spasms is absolutely frightful to contemplate. The face becomes deadly pale, and the brows get contracted; the skin covering the forehead is corrugated; the eyes are fixed and prominent—sometimes suffused with tears; while the nostrils are dilated, the corners of the mouth drawn back, the teeth exposed, and the features fixed in a sort of grin—the *risus sardonicus*. The respirations are performed with difficulty and anguish; severe pain is felt at the sternum; and there is great thirst, but the agony is increased by attempts at deglutition. The pulse, too, is feeble and frequent; the skin is covered with perspiration, and the patient cannot sleep, or if he dozes it is only for a few minutes at a time. Yet with all this suffering the intellect remains clear and unaffected. Death at length ends the agony, the release being due partly to suffocation and partly to exhaustion.

There is a peculiar form of this affection called *Trismus nascentium*, that occurs in young infants about the second week after birth, and which is very fatal. It is exceedingly rare in this country; though some eighty years since, when the Dublin Lying-in Hospital was badly ventilated, it proved one of the most prominent causes of the infantile mortality in that institution. Tetanus infantum is still common in the West Indies, where it sometimes seems to rage as an epidemic. When prevalent, great care ought to be taken to guard the new-born child from cold or foul air, improper feeding, imperfect cleansing, and from retention of the meconium; while attention should also be paid to prevent improper management of the remains of the umbilical cord by the nurse. In dividing the funis at birth, not more than two inches should be left attached to the umbilicus.

With regard to the *morbid anatomy* of tetanus, very little that is certain is as yet known. Mr. J. Lockhart Clarke, in describing the condition of the spinal cord in six cases, says that in every one there was more or less congestion of the bloodvessels, together with definite, and frequently extensive lesions of structure. These lesions consisted of disintegrations of tissue in different stages of progress, from a state of mere softening to one of perfect fluidity, accompanied by certain exudations and extensive effusions of blood. They were found chiefly in the gray substance; which was, moreover, in many places, strangely altered in shape—unsymmetrical on the opposite sides, or partially fused with the adjacent white column in a common softened mass. Although lesions of this kind existed in one form or other in every region of the cord, they were absent in some places; nor did they ever for long together maintain the same size or appearance, but were constantly and alternately increasing or disappearing at short intervals. These lesions in tetanus are similar in character to those which Mr. Lockhart Clarke has discovered in the spinal cord of many cases of paralysis in which there has been no spasm. Hence it follows that the former disease, in regard to its morbid anatomy, differs from the latter only in being associated with a morbid condition or injury of some of the peripheral nerves. "It would therefore appear that this condition or injury of the peripheral nerves is the determining cause of the phenomena, and that the spasms of tetanus depend on the conjoint operation of two separate causes. First, on an abnormally excitable state of the gray nerve-tissue of the cord, induced by the hyperæmic and morbid state of its bloodvessels, with the exudations and disintegrations resulting therefrom. This state of the cord may be either an extension of a similar state along the injured nerves from the periphery, or may result from reflex action on its bloodvessels excited by

those nerves. Secondly that the spasms depend on the persistent irritation of the peripheral nerves, by which the exalted excitability of the cord is aroused: and thus the cause which at first induced in the cord its morbid susceptibility to reflex action is the same which is subsequently the source of that irritation by which the reflex action is excited."*

The *treatment* is commonly empirical, and generally—it must be confessed—useless. Since the publication of the fifth edition of this work, however, some very encouraging success has followed the employment of the ordeal bean of Calabar. The officinal extractum physostigmatis is the best preparation for use: the dose varying from $\frac{1}{16}$ to $\frac{1}{8}$ grain for ordinary purposes. But in the disease under consideration much larger quantities are needed: and at least one-fourth of a grain should be given every hour until an effect is produced. If injected subcutaneously, the dose may consist of one-sixth of a grain in eight or ten minims of water, every two or three hours. Directly there is any feeling of sinking, stimulants and essence of beef must be given.

The Calabar bean failing, or not being indicated in any particular case, what is to be done? There are four remedies on which, it seems to me, some little reliance can be placed, viz., belladonna, chloroform, quinine and wine. Opium has never been found to do any good: and it is not rendered probable that the use of it is objectionable, since this drug induces a state of congestion and polar excitement of the spinal cord somewhat similar to that caused by strychnine. Opium is known to contract the unstriped muscular fibre of the sphincter of the pupil, and perhaps also some of the voluntary or striped muscles of other parts. Belladonna and tobacco, and less powerfully henbane and hemlock, dilate the pupil and relax the voluntary muscles. Belladonna may be applied to the spine locally, smearing the extract well over this part; while it can also be administered internally, in doses of half a grain or one grain with two grains of quinine every four hours. The patient might also be kept under the influence of chloroform for very many hours: indeed I would not mind trying its use for one or more entire days, provided no symptoms such as a failing pulse, to forbid it, arose during its operation. Under the influence of this anæsthetic the pulse falls to its natural standard, the respiration becomes easy, and all indication of suffering subsides; but as soon as the remedy is suspended, the fatal symptoms again begin to show themselves. With regard to quinine, from three to five grains may be given every four or six hours, either by the mouth or rectum or subcutaneously.

Considering that the action of woorara is antagonistic to the effects of the artificial tetanus of strychnia, it was hoped that this agent might prove useful in traumatic and idiopathic tetanus. It has now been used by inoculation in several cases; but the result, on the whole, has been unfavorable. Mr. Spencer Wells has suggested that, as the specimens of the extract brought to this country vary in strength, in future trials it would be as well to use a solution of the active principle of woorara—the alkaloid curarina. Further experiments are perhaps desirable before giving up this medicine. Again, a severe example of traumatic tetanus was successfully treated with nicotin by Mr. Tufnell in March, 1862. Fifty-six drops (one or two for each dose) were administered in six days; each drop being equivalent to 23.3 grains of Virginia Cavendish tobacco. The Rev. Professor Haughton had previously met with successful cases from the employment of this agent.

There are a few other points worthy of recollection. Thus, if deglutition

* Medico-Chirurgical Transactions, vol. xlviii, p. 263. London, 1865.

be difficult, enemata must be used. The inhalation of pure oxygen gas, diluted with about three times its volume of air, will often afford relief and prove agreeable to the patient's feelings (F. 370). Any bronchial irritation which may be produced by the gas will cease on discontinuing its use. I should also be inclined to try the prolonged application of ice to the spine. Some practitioners recommend the frequent use of the warm bath, while others prefer the cold douche; but neither appears to have been of much utility. A few authorities have faith in conium when applied locally and taken internally; while cures have followed the exhibition of aconite. Remembering the supposed toxic origin of the disease, it might be worth while to see the effect of the sulphite of soda or magnesia (F. 48), other remedies failing. Purgatives will generally be necessary; full doses of calomel and jalap, repeated until the bowels have been thoroughly evacuated, being as efficient as any other medicine of the class of aperients. Finally, it may save valuable time to remember that bloodletting, blisters, mercury, antimony, colchicum, large doses of assafœtida, turpentine, digitalis, musk, iron, hydrocyanic acid, and the extract of Indian hemp, have all been repeatedly employed, and as often caused disappointment.

XVIII. SLEEP AND SLEEPLESSNESS.

The necessity for *sleep* is apparent in all animals. In the very young, while the functions of nutrition are most active and the waste of the system is small, the whole time is occupied in eating and sleeping. During adult life, about one-third of the twenty-four hours is passed in repose. In old age, when the nutritive operations are carried on with less vigor, more sleep is needed, to allow of the system being spared as much as possible.

Sleep may be said to be especially the rest of the nervous centres. Repose is necessary for repair and nutrition. Not that these processes occur only during sleep, but for their perfection sleep is required. Sleep, in short, aids all those processes by which the nutrition of the different organs is effected. Even in the heart's action there is a period of repose. It is true that the rest after each pulsation is short; but the total amount in the twenty-four hours becomes considerable. In the same way if we analyze the act of respiration and separate it into three portions, one will be seen to be devoted to inspiration, one to expiration, and the third to a pause. Hence, during eight hours of the twenty-four the muscles of the thorax and the lungs are in a state of rest.

Sleep is preceded by a softly approaching languor and welcome drowsiness; during which the emotions and mental sensations are gradually lulled into forgetfulness. The eyelids become heavy and droop; and then little by little the senses of sight, hearing, and touch, fail in succession. With the limbs semiflexed and yielding to lassitude, the voluntary movements cease. The eyes are turned upward, the pupils are contracted, the respiration and circulation get slow, consciousness has become imperceptibly abolished, and there is deep calm sleep. From the time of this occurring until complete awakening, there is seldom one continuous state of repose. There are unquestionably periods of more or less imperfect slumber, when movements are performed under the influence of external impressions. Thus we seldom awake in the same position in which sleep came on, though there may be no consciousness of any change having been made. According to Sir

Henry Holland, sleep, "in the most general and correct sense of the term, must be regarded not as one single state, but a succession of states in constant variation: this variation consisting, not only in different degrees in which the same sense or faculty is submitted to it, but also in the different proportions in which these several powers are under its influence at the same time."* Man requires about eight hours of sleep; and should not, as a rule, have less, if he would duly repair the waste which has arisen from active occupation. Numerous individuals do with five or six hours, even for a considerable term; but I am inclined to think that many such enjoy snatches of slumber at odd times which they fail to reckon. Students working for an examination will often restrict themselves to five hours nightly for a few weeks; but they subsequently make up for the deficiency by passing nine and ten hours in bed for three or four weeks afterwards. Doubtless, however, habit and temperament control us much in this respect.

Many physiologists have thought that venous pressure upon the encephalon was the cause of sleep. But the evidence in favor of this hypothesis breaks down upon a close examination. It has been argued that because coma is undoubtedly the result of congestion and pressure, so sleep must own the same cause; but the fact is that the two conditions are in no way identical. The general inactivity of the brain during slumber is better accounted for on the supposition that there is a withdrawal of blood from the cerebral tissues, rather than an increased quantity. Dr. Pierquin observed in 1821, in one of the hospitals of Montpellier, a female patient, part of whose skull and dura mater had been destroyed by disease. The brain was perfectly motionless when she was in a dreamless sleep. When slightly agitated by dreams, there was elevation of the brain: when the dreams were vivid, the brain protruded through the opening in the skull, forming a cerebral hernia. The same phenomena were seen when she was perfectly awake, if engaged in active thought or sprightly conversation. Blumenbach has also mentioned cases in which, portions of the skull having been lost, he witnessed a sinking of the brain during sleep and a swelling with blood when the patient awoke. Dr. Alexander Fleming, while preparing a lecture on the action of narcotics, conceived the idea of trying the effect of compressing the carotid arteries with the fingers, on the functions of the brain. In several experiments made on himself and others it was found, that complete unconsciousness continued so long as the pressure was kept up. "A soft humming in the ear is heard; a sense of tingling steals over the body, and in a few seconds complete unconsciousness and insensibility supervene, and continue so long as the pressure is maintained."† Dr. Fleming also adds, that the period of profound sleep never lasted more than fifteen seconds, although these seconds seemed like hours. In order positively to determine the condition of the cerebral circulation during sleep, Mr. Durham resorted to an ingenious experiment.‡ A dog having been chloroformed, a portion of bone the size of a shilling was removed from the parietal region of the skull, and the subjacent dura mater partially cut away. The part of the brain thus exposed appeared inclined to protrude. The large veins over its surface were distended, and the smaller vessels of the pia mater seemed full of dark-colored blood; while there was

* Chapters on Mental Physiology. Second Edition, p. 15. London, 1858.

† On the Induction of Sleep and Anæsthesia by compression of the Carotids. "The British and Foreign Medico-Chirurgical Review," vol. xv, p. 529. London, 1855.

‡ The Physiology of Sleep. "Guy's Hospital Reports." Third Series, vol. vi, p. 153. London, 1860.

no appreciable difference in color between the arteries and veins. The longer the exhibition of the chloroform was continued, the more distended did the veins become. But as the deep anæsthesia passed off, the animal fell into a comparatively natural sleep. As he did so, the surface of the brain became pale, and sank rather below the level of the bone; the veins were no longer distended; a few small vessels containing arterial blood could be seen; and many previously congested vessels were now hardly distinguishable. After a time the dog was roused; and then the brain again rose, the pia mater became more injected, the cerebral surface assumed a bright red color, and the veins and arteries appeared full of blood. After feeding, the animal again was allowed to sleep: the bloodvessels resumed their former dimensions and appearance, and the surface of the brain became pale as before. From his experiments Mr. Durham concludes, the pressure of distended veins on the brain is not the cause of sleep; during sleep the brain is comparatively bloodless, and the rapidity of the circulation diminished; the blood derived from the brain during sleep is distributed to the alimentary and excretory organs; whatever tends to increase the activity of the cerebral circulation favors wakefulness.

Dr. Parkes points out the difficulty of ascertaining the effect of sleep on the urine, owing to the impossibility of eliminating the effect of other influences. According to some observers, sleep diminishes this excretion. But the result of experiments performed by Dr. Böcker on his own person has been to show that all the urinary ingredients are increased during slumber, with the exception of the uric acid, phosphoric acid, and the fireproof salts. The increase in the sulphuric acid was slight, that in the urea very great. The decrease in the uric acid was considerable, in the phosphoric acid very great. "This would seem to show," says Dr. Parkes, "that the disintegration of nervous tissue is lessened during sleep."*

Heat creates drowsiness, and severe cold does the same. A hearty meal generally predisposes to it. A morbid disposition to sleep is a symptom of imperfect nutrition and degeneration of nervous tissue. Such a tendency is often the precursor of apoplexy; or it may be due to renal disease, with imperfect elimination of urea; or it will arise from alcoholic intoxication; or it can be caused by anæmia generally. The circulation of imperfectly oxygenated blood through the brain also causes narcosis, as is seen in those diseases which interfere with the process of respiration. A remarkable example of prolonged sleep, probably owing to anæmia and faulty nutrition of brain, has been published by Dr. J. Ward Cousins. The chief points in the report are these: J. C., a farmer, ætat. 44, has been subject at intervals, during the last twenty years, to attacks of deep and prolonged sleep. The disorder began in 1842 or 1843, after getting very wet and suffering from a severe cold, and continued nearly a year. It returned in 1848, after catching cold, and persisted for nearly eighteen months. He was then free until the commencement of a long attack on May 19th, 1860, since which time he has not slept naturally. He retires to bed at night soon after ten o'clock, and almost immediately falls into a profound sleep, from which all attempts at rousing him have failed. His appearance remains natural while asleep; but his face and ears are pale, feet often cold and livid, respiration scarcely perceptible, pulse slow and feeble, &c. He awakes suddenly, and always seems refreshed. The longest period he has ever passed in profound sleep is five days and five nights. He has frequently slept three and four days, but the average is nearly two days. He is awake

* The Composition of the Urine in Health and Disease, and under the Action of Remedies, p. 91. London, 1860.

about four or five hours out of the forty-eight. During these sleeps he does not dream; the contents of the bowel and bladder are always retained; and, on awaking, his first question is, "How long have I slept?" Lately, he has looked pale and lost flesh. In 1848 he suffered frequently from spasmodic trismus, but has not done so since.* At this point, Dr. Cousins' connection with the case seems to have ceased, and I am indebted to Dr. Gimson for having kindly favored me with the subsequent history. The attacks of profound sleep continued to recur. Thus, from between 11 and 12 P.M., on January 2d, 1866, J. C. slept until 2 P.M. on the 6th. At midnight, on February 4th, he went to sleep, and did not awake until 4 P.M. on the 8th; going off again about 11 P.M. sleeping until the 11th, when he remained awake for nine hours, and then sleeping again for nearly four days. With the exception of five hours, he slept from the 16th to the 26th of February. In March he slept from 10 P.M., on the 9th, until 4 P.M. on the 15th. No food was taken during any of these sleeps, nor was urine or motion passed. He died on the 23d of December, 1866. At the necroscopy the head only was examined. The skull was well formed; the bones were thin. The calvarium was readily separated from the dura mater. This membrane was normal, except over the anterior portion of the right hemisphere, where it appeared thickened and adherent to the pia mater. The brain-substance was healthy. Indeed, nothing at all abnormal could be observed beyond a varicose condition of the vessels of the choroid plexus; these vessels being not only dilated, but bulging in knots about the size of hemp-seeds. The body generally was pale and wasted, while the rigor mortis was extreme 48 hours after death.

Insomnia or *sleeplessness* not only often forms one of the premonitory symptoms of insanity, but when persistent is a prominent cause of lunacy. Wakefulness is commonly present in mania, greatly aggravating the disease. Sometimes the insane are afraid to sleep because of the frightful dreams and visions which they experience, but often the desire for repose seems banished. All exciting passions have a tendency to prevent sleep, and many acute diseases, in their early stages especially, act in the same way. In some cases of jaundice there is sleeplessness, while others are characterized by excessive drowsiness. Probably, the greater the amount of blood poisoning, the greater the disposition to somnolence. Dyspepsia is a fertile source of restlessness, and so is the use of strong tea and coffee. Mental anxiety, with doubt or uncertainty as to the result of some important action of life, will cause morbid wakefulness; though grief and sorrow, especially if irremediable, produce sleep by the nervous exhaustion they have brought about. So, also, bodily suffering frightens "Nature's soft nurse," while the ill effects of disease of the heart or large vessels are often aggravated by imperfect and disturbed sleep. And lastly, women of a nervous excitable temperament are often annoyed by an inability to obtain sound repose during pregnancy, or they may suffer from complete insomnia after delivery. In the latter case the practitioner must be on his guard lest puerperal mania supervene.

It is difficult to say for what length of time a person might exist without sleep. Dr. Forbes Winslow quotes the following case, which seems to

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* Medical Times and Gazette, p. 396. London, April 18th, 1863. The same history is published by Dr. Gimson, British Medical Journal, p. 616, June 13th, 1863. The reader will also find the notes of some half-dozen anomalous cases of this nature in The Philosophy of Sleep, by Robert Macnish, p. 215. Glasgow, 1830.

have occurred in 1859:* A Chinese merchant, convicted of murdering his wife, was sentenced to die by being deprived of sleep. The condemned was placed in prison under the care of three of the police guard. The latter relieved each other every alternate hour, and they prevented the prisoner from falling asleep night or day. He thus lived nineteen days without any repose. At the commencement of the eighth day he implored the authorities to grant him the blessing of being strangled, guillotined, burned to death, drowned, garotted, shot, quartered, blown up with gunpowder, or put to death in any conceivable way which their humanity or ferocity could suggest.

The need for sleep is as great as that for nourishment; the suffering which ensues upon enforced wakefulness being only equalled by that caused through the want of water. At that disgusting exhibition on the Place de Grève, Paris, in March, 1757, when Damiens (condemned as a regicide to be torn asunder by four horses) was tortured in a barbarous manner prior to execution, he remarked, just before death, that the deprivation of sleep had been the greatest of all his torments. The story goes that the French General Pichegru, while being tracked by the police of Bonaparte, gave 30,000 francs for a night's sleep; this sum, however, being insufficient to secure safe repose, for on that very night he was betrayed and given up. Again, amongst the fearful iniquities of the "Ordeal" and "Torture," the system of Marsiglio was highly commended. This consisted in keeping the victim from sleep for forty hours; upon which practice Farinacci jocosely remarked, that a hundred martyrs exposed to it would become confessors to a man.

To secure repose which may be refreshing and renovating to both mind and body, in cases where there is unnatural wakefulness, a proper amount of exercise should be taken; the diet ought to be digestible, and especially such as will not favor the production of flatulence or acidity; and no tea or coffee must be allowed in the afterpart of the day. In many cases I have seen benefit from the dinner being taken at half-past one or two o'clock in the afternoon, as was the old-fashioned custom, while a light supper has been enjoyed about an hour before bedtime; the good effect being due to the stomach attracting blood to perform its work in digesting food, and so lessening the amount to circulate through the brain. The reading of exciting works of fiction late in the evening is to be prohibited; and everything that is possible should be done to prevent the normal functions of the brain from being in any degree exaggerated during the day. The patient had better retire to rest at an early and regular hour; the apartment should be quiet, and proper means taken to have it well ventilated; and if the weather be at all chilly, a fire can often be kept up during the night with great advantage. Although a very low temperature predisposes to somnolence, yet I am sure that the moderate degree of cold which we have for six or eight months in this country has quite the reverse effect with many delicate individuals. The bed should consist of a mattress, without too many blankets; the pillows ought to be firm and high, so as to support the head well; and no curtains or hangings are to be permitted.

If attention to these simple rules fails to produce the desired effect, one or other of the following different plans may be practiced perhaps somewhat empirically. For example, Bacon used to indulge in a posset of strong ale, to subdue the activity of his mind, before going to bed; and following this suggestion I have frequently seen a good result, particularly

* On Obscure Diseases of the Brain and Disorders of the Mind. Second Edition, note, p. 580. London, 1861.

where there has been any debility, from a tumblerful of port-wine negus, or of mulled claret, or of hot elder wine, or of white-wine whey, being taken the last thing at night. In other instances, where the skin has been hot and dry, a glass of cold water has appeared to be useful. So, again, the employment of a bath for about three or five minutes, at a temperature varying from 90° to 96° F., just before getting into bed, often affords relief; as does also a rapid sponging of the body with tepid water. Sometimes the use of a warm foot-bath (at a temperature of 100° Fahr.), or of a hot-water bottle in the bed, acts favorably, by drawing the blood from the brain to the extremities. I have read somewhere, that it is a frequent practice in Kashmir for mothers to put their children to sleep by exposing their heads to a small stream of cold water for a couple of hours; a practice which can only act by inducing cerebral anæmia.

When any physical cause for the wakefulness is discovered, it must of necessity be removed. Thus, if the bowels are constipated, or if the excretions are unhealthy, laxatives and alteratives will be required. Patients afflicted with heartburn should take three or four bismuth lozenges on retiring to rest. If there be headache, a rag dipped in cold water will be useful; while in some acute diseases the application of a bladder containing ice to the scalp may be advised. These measures failing, all kinds of mental labor or excitement during the day must be greatly lessened, and to a considerable extent replaced by physical exertion. Attempts may be made to get into "the land of Nod," while comfortably seated in an easy chair. Recourse can likewise be had to sedatives; for although the primary influence of these agents may be exciting, yet their secondary action is undoubtedly narcotic. At first perhaps, henbane, hop, Indian hemp, or conium, had better be tried, since they neither affect the head nor confine the bowels. But not unfrequently stronger drugs will be needed. And then one-sixth or a quarter of a grain of morphia, with some spirit of chloroform; or half a grain of extract of opium, with a quarter of a grain of extract of belladonna, and four grains of hyoscyamus; or twenty drops of the liquid extract of opium, with the spirit of ether, either of these may be prescribed. Frequently I have found the exhibition of opiate enemata, or suppositories, or subcutaneous injections, preferable to the use of opium or morphia by the mouth. In insomnia due to nervous irritability, large doses of bromide of potassium (twenty or thirty grains at bedtime) are to be recommended; one of the effects of this drug being probably to lessen the quantity of blood in the nervous centres, and so to cause drowsiness.

There can be no doubt that the manœuvres employed by mesmerists will induce sleep, when practiced on certain susceptible persons. In properly selected cases there is no objection to the physician resorting therefore to this remedy. "For my own part," remarks Dugald Stewart, "it appears to me that the general conclusions established by Mesmer's practice, with respect to the physical effects of the principle of imitation and of the faculty of imagination (more particularly in cases where they co-operate together), are incomparably more curious than if he had actually succeeded in ascertaining the existence of his boasted fluid. Nor can I see any good reason why a physician, who admits the efficacy of the *moral* agents employed by Mesmer, should, in the exercise of his profession, scruple to copy whatever processes are necessary for subjecting them to his command, any more than he would hesitate about employing a new *physical* agent, such as electricity or galvanism."* Similar in its results to mesmerism, is hypnotism [from

* The Collected Works of Dugald Stewart, F.R.S., &c. Edited by Sir W. Hamilton, vol. iv, p. 167. Edinburgh, 1854.

Ὕπνος = sleep + terminal ισμὸς], which Mr. Braid believes is capable of effecting more good than can be accomplished by the ordinary mesmerizing processes. This gentleman says: "My usual mode of inducing the sleep is to hold any small, bright object about ten or twelve inches above the middle of the forehead, so as to require a slight exertion of the attention to enable the patient to maintain a steady, fixed gaze on the object; the subject being either comfortably seated or standing, stillness being enjoined, and the patient requested to engage his attention, as much as possible, on the single act of looking at the object, and yield to the tendency to sleep which will steal over him during this apparently simple process. I generally use my lancet-case, held between the thumb and first two fingers of the left hand; but any other small bright object will answer the purpose. In the course of about three or four minutes, if the eyelids do not close of themselves, the first two fingers of the right hand, extended and a little separated, may be quickly, or with a tremulous motion, carried towards the eyes, so as to cause the patient involuntarily to close the eyelids, which, if he is highly susceptible, will either remain rigidly closed, or assume a vibratory motion—the eyes being turned up, with, in the latter case, a little of the white of the eye visible through the partially closed eyelids. If the patient is not highly susceptible, he will open his eyes, in which case request him to gaze at the object, &c., as at first; and, if they do not remain closed after a second trial, desire him to allow them to remain shut after you have closed them, and then endeavor to fix his attention on muscular effort, by elevating the arms if standing, or both arms and legs if seated, which must be done quietly, as if you wished to suggest the idea of muscular action without breaking the abstraction or concentrative state of mind, the induction of which is the real origin and essence of all which follows."*

Before concluding these remarks, a few words must be said on *dreams*, *somnambulism*, and *nightmare*. With regard to the first, it is most probable that dreams only occur during imperfect sleep, when there is partial or uncontrolled activity of the nervous centres. They are most common towards the morning, as consciousness is gradually returning. Many dreams are forgotten, especially those which are followed by sound sleep, just as the rambling talk of a patient slightly under the influence of chloroform is not remembered, if the inhalation be continued until complete anæsthesia ensues. The nature of the dream may be suggested by external circumstances, and, although it will often consist of contradictory, and grotesque, or horrible elements, yet occasionally it presents a logical sequence of events free from exaggeration. In the words of Ben Jonson, there are "dreams that have honey and dreams that have stings." Disturbed and frightful dreams are sometimes the precursors of cerebral softening, apoplexy, insanity, tubercular meningitis, and epilepsy. Children are commonly alarmed by their dreams, the goblins and scarecrows having their origin in uneasiness from teething, a loaded bladder, irritation of the bowels, &c.

The somnambulist dreams and carries out his conceit. His movements appear to have the precision of one awake, because he is familiar with the objects and actions which he pictures to himself. The phenomena of somnambulism vary from simple talking or crying to the performance of various actions, as if the senses were in full activity and under the control of the understanding.

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* Magic, Witchcraft, Animal Magnetism, Hypnotism, and Electro-Biology. Third Edition, p. 57. London, 1852.

In nightmare or incubus [from *Incubo* = to lie upon] there are generally apparitions, horrible or ludicrous, with always a distressing consciousness of inability to move. It may arise from the presence of indigestible food in the stomach, or from pressure upon this organ, or from flatulence with acid secretions. The suffering usually commences with a disagreeable vision, and the sleeper attempts to escape from some imaginary danger. Then he experiences a sense of suffocation, which increases until there is an imperfect consciousness that he is in bed. But still there continues the tormenting oppression from the weight on the chest, which keeps him lying on his back, and he feels unable to inflate his lungs. The oppressed breathing becomes most painful, palpitations of the heart set in, attempts are made to move the arms, but it is found impossible to do so, and the countenance assumes a ghastly expression with the eyes half open. Within a minute or two the power of volition returns, and then the patient, accustomed to these attacks, immediately and thoroughly rouses himself, fearful lest the horrid paroxysm should recur.

Spasmodic contraction of the diaphragm and intercostal muscles has been assigned as the proximate cause of nightmare. Dr. Hodgkin, himself a sufferer, attempted to analyze the symptoms. The chief point he succeeded in making out was, that the involuntary movements of respiration appeared to be suspended, whilst the chest seemed to be passively collapsing. Following up the indications derived from this observation, he found that most speedy relief was obtained from so moving the arms that the pectoral muscles might elevate the ribs; and he consequently begged that, whenever he appeared to be under the influence of an attack, one of his arms might be worked like the handle of a pump.* In cases where the seizure is apt to return on the same night, it may be warded off by an antacid draught (a little soda and ammonia in water), or by two or three bismuth or bicarbonate of soda lozenges. Of course, heavy suppers, and food likely to induce dyspepsia (especially malt liquors), should be rigidly avoided.

XIX. HYPOCHONDRIASIS.

The hypochondriac disorder [from Ὑποχονδριακὸς = affected in the viscera under the false ribs,—because such affection was regarded as the cause of melancholy], or the *vapors*, or the *spleen*, has received attention from the healers of the sick, whether priests or physicians, since the days of Hippocrates. The ancients imagined that the morbid sensations characteristic of this affection had their origin about the pyloric orifice of the stomach, or in the mesentery, or the liver, or the spleen. The followers of Galen maintained that the melancholy symptoms were due to black bile; a view which was held until Willis, in 1676, insisted that they were caused by the action of unhealthy splenic blood on the nervous system. Subsequently, more and more stress was laid upon the neurotic character of the affection; though it is scarcely half a century since the propriety of regarding "low spirits" as a nervous disease was generally determined.

Hypochondriasis may be said to consist prominently of an exaggerated egoism. With mental depression there is frequently functional derangement (occasionally structural disease) of certain organs, especially of those

* British Medical Journal, p. 501. London, May 16th, 1868.

connected with the nutritive processes; these derangements occurring either primarily or secondarily to the erroneous action of the mind. The hypochondriac is ever writhing under the petty despotism of an imaginary evil. He fulfils all his duties naturally, and generally with amiability, for a season; but he is morbidly sensitive of the opinions and actions of other men, while he is also constantly tormenting himself by dwelling upon his own miserable condition. There is an unceasing dread of the existence of internal disease; with the fear either of impending insanity or of death. To the same extent that hysteria is peculiar to the female, so hypochondriasis is the special affliction of the male sex.

This disorder may vary in degree, just as individuals of different constitutions and temperaments possess a variable amount of control over the feelings and faculties of the mind. Doubtless education has also a considerable amount of influence in this respect. And it is not an extravagant assertion to say, that he who is commonly called a strong-minded man may shake off a real indisposition, to which another person, less happily constituted, will succumb, so remarkable is the power of the mind over the body. To believe firmly in one's ability and power of endurance to accomplish some great end, goes a long way towards attaining it. There is probably nothing which a sensible and persevering man may legitimately covet that he cannot obtain, if only he determine to take the necessary steps. The influence of the will over even the involuntary muscles is sometimes extraordinary, as many remarkable cases attest. Thus, Celsus speaks of a priest who could separate himself from his senses when he chose, and lie like a man void of life and sense. Cardan used to boast of being able to do the same. But the most surprising example of this kind is the well-known case of Colonel Townshend, related by Dr. George Cheyne.* The very es-

* The quaint description given by this author of his patient's unnatural skill runs thus: "*Colonel Townshend*, a Gentleman of excellent Natural Parts, and of great *Honor* and *Integrity*, had for many years been afflicted with a *Nephritic* Complaint, attended with constant *Vomitings*, which had made his Life painful and miserable. Dureing the whole time of his *Illness*, he had observed the strictest *Regimen*, living on the softest Vegetables and lightest *Animal Foods*, drinking *Asses Milk* daily, even in the Camp; and for common Drink *Bristol* Water, which the Summer before his death, he had drunk on the *Spot*. But his Illness increasing and his Strength decaying, he came from *Bristol* to *Bath* in a Litter, in Autumn, and lay at the *Bell-Inn*. Dr. *Baynard* (who is since dead) and *I* were called to him, and attended him twice a Day for about the space of a Week, but his *Vomitings* continuing still incessant, and obstinate against all Remedies, we despaired of his *Recovery*. While he was in this Condition he sent for us early one Morning: we waited on him, with Mr. *Skrine* his Apothecary (since dead also); we found his *Senses* clear, and his *Mind* calm, his Nurse and several Servants were about him. He had made his *Will* and settled his Affairs. He told us he had sent for us to give him some Account of an *odd Sensation* he had for some Time observed and felt in himself: which was, that composing himself, he could *die* or expire when he pleased, and yet by an *Effort*, or somehow he could come to Life again, which it seems he had sometimes tried before he had sent for *us*. We heard this with *Surprize*, but as it was not to be accounted for from now *common Principles*, we could hardly believe the *Fact* as he related it, much less give any Account of it: unless he should please to make the *Experiment* before us, which we were unwilling he should do, lest, in his weak Condition, he might carry it too far. He continued to talk very distinctly and sensibly above a Quarter of an Hour about this (to Him) surprising *Sensation*, and insisted so much on our seeing the *Trial* made, that we were at last forced to comply. We all *three* felt his pulse first: it was distinct, tho' small and *threedy;* and his Heart had its usual Beating. He composed himself on his Back, and lay in a still posture some time: while *I* held his right Hand, Dr. *Baynard* laid his Hand on his *Heart*, and Mr. *Skrine* held a clean Looking-Glass to his Mouth. I found his *Pulse* sink gradually, till at last I could not feel any, by the most exact and nice Touch. Dr *Baynard* could not feel the least motion in his *Heart*, nor Mr. *Skrine* the least Soil of

sence of hypochondriasis, however, is a want of resolution,—an inability to resist "thick-coming fancies." This morbid condition is a gigantic evil, the rock on which many an amiable man's happiness has been wrecked. It may seem hard to say so, but the affection is often the offspring of selfishness and indolence. At the same time there is sometimes associated with it bodily disease; although the injurious influences of this, as well as the symptoms it gives rise to, are greatly exaggerated. The most frequent of these affections belong to the stomach, liver, right side of the heart, large vessels, and urinary organs. In most instances the circulation is languid, and cold feet are particularly complained of. While, therefore, on the one hand, care must be taken not to overlook the existence of organic disease, when present; so, on the other, it ought to be remembered that there is generally only a simulation of some serious malady, with functional disturbance of the viscus to which the attention is morbidly directed. Moreover, occasionally the organic affection is slight. Thus, some remarkable cases of long-standing hypochondriasis have fallen under my observation, where the only disease discoverable after careful and repeated examination has been in the teeth. And in such, no real or permanent benefit has arisen from treatment until the foul stumps or carious organs have been all extracted.

No station in life gives immunity to attacks of hypochondriasis. But perhaps the most frequently affected are such as have been accustomed to an active life; yet who having retired to enjoy the fruits of their industry, get oppressed with ennui, having no other means of employing themselves than that which they have thrown up. So also those who, from their social position, have not been brought up to any occupation, suffer greatly; those accustomed to sedentary pursuits, who neglect to take the exercise neces-

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Breath on the bright *Mirror* he held to his Mouth; then each of us by *Turns* examined his *Arm*, *Heart*, and *Breath*, but could not by the nicest *Scrutiny* discover the least *Symptom* of *Life* in him. We reasoned a long time about this odd *Appearance* as well as we could, and all of us judging it inexplicable and unaccountable, and finding he still continued in that Condition, we began to conclude that he had indeed carried the *Experiment* too far, and at last were satisfied he was actually dead, and were just ready to leave him. This continued about half an Hour. By Nine o'Clock in the Morning in autumn, as we were going away, we observed some Motion about the Body, and upon Examination found his *Pulse* and the *Motion* of his *Heart* gradually returning; he began to *breath* gently and speak softly; we were all astonish'd to the last Degree at this unexpected Change, and after some further Conversation with him, and among ourselves, went away fully satisfy'd as to all the Particulars of this Fact, but confounded and puzled, and not able to form any rational *Scheme* that might account for it. He afterwards called for his *Attorney*, added a *Codicil* to his *Will*, settled Legacies on his Servants, received the *Sacrament*, and calmly and composedly expir'd about five or six o'Clock that Evening. Next Day he was opened (as he had ordered): his Body was the soundest and best made I had ever seen; his *Lungs* were fair, large, and sound, his *Heart* big and strong, and his *Intestines* sweet and clean; his *Stomach* was of a due Proportion, the *Coats* sound and thick, and the villous *Membrane* quite entire. But when we came to examine the Kidneys, tho' the *left* was perfectly sound and of a just *Size*, the *right* was about four Times as big, distended like a blown *Bladder*, and yielding as if full of Pap; he having often pass'd a *Wheyish* Liquor after his Urine, during his Illness. Upon opening this *Kidney*, we found it quite full of a white *Chalky* Matter, like *Plaster of Paris*, and all the fleshy substance dissolved and worn away, by what I called a *Nephritick Cancer*. This had been the Source of all his Misery; and the *symptomatick* Vomitings from the Irritation on the consentient *Nerves* had quite starved and worn him down. I have narrated the *Facts*, as I saw and observed them deliberately and distinctly, and shall leave to the *Philosophick Reader* to make what Inferences he thinks fit; the Truth of the material Circumstances I will warrant."—The English Malady; or a Treatise of Nervous Diseases of all Kinds, as Spleen, Vapors, Lowness of Spirits, Hypochondriacal and Hysterical Distempers, &c., p. 307. London, 1733.

sary for maintaining the healthy mind in the sound body; and those again who overwork the mind, or who have any prolonged mental anxiety, or who have imperfectly recovered from a tedious and prostrating sickness. The dejection, slight at first, gradually becomes extreme. Poor Cowper, writing to congratulate a friend on his recovery from severe disease, says, "Your illness has indeed been a sad one, causing, no doubt, great distress to yourself, and considerable anxiety to your relatives and friends. But, oh! what are your *bodily* sufferings, acute as they undoubtedly were, to the unceasing *mental* torture I suffer from *a fever of the mind!*" Under such suffering it is hardly surprising that men have attempted suicide, as indeed Cowper did;* believing with the Son of Sirach, that "Death is better than a bitter life or continual sickness."

Reading men at the Universities are not uncommonly tormented with great depression of spirits. Sometimes this is connected with spermatorrhœa, of which more will be said on a future page; often the conscience is oversensitive, and the importance of becoming distinguished is exaggerated; frequently the strain produced by excessive mental labor, with the fear of ungratified ambition, is the only cause; but above all, I would attribute the mischief to the very imperfect way in which our youths are educated at the various public and other schools. That the supervision by the masters over the teaching of the boys is often of such a desultory and sluggish character that the latter need only learn just as much or as little as they please, is merely a part of that vicious system which leaves the cultivation of the bodily strength entirely to chance. There surely ought to be no necessity for insisting at the present day, that the employment and improvement of the physical powers require to be encouraged and carefully supervised; and that as with the mental studies, there is a proper process to be used. Far from being an advocate for those violent athletic exercises in which one youth is pitted against another, I am strongly inclined to condemn them. What I really desire to see is a methodical system of drill and exercise fitted to produce a sound constitution in the average boy. To secure this, every school ought to have a well-fitted gymnasium, attendance and work in which should be as regular and systematic as in the class-room. Not that any compulsion would be necessary; for undoubtedly one part of a clever teacher's business would be to prevent the young plucky gymnasts from performing too venturesome feats before they were sufficiently prepared.

Entertaining these views, my treatment of hypochondriasis may be imagined. In these cases, as in others of a similar kind, I have seen the greatest benefit from recommending young men to go through a modified system of physical training.† By this practice the invalid not only relieves his weary mind at the time; but, while bringing the various muscles and tissues into play he obtains general vigor, energy of body, buoyancy of spirits, a power of self-command, and, in short, that happy, desirable feeling which constitutes perfect health. The first rule in following such a course of treatment is to obtain natural, quiet sleep; to procure which the

* The description of this attempt, as given by the poet himself, is of special interest to the psychological student. It is too long for quotation, and will not bear curtailment. See the Poetical Works of William Cowper. Edited by Robert Bell, vol. i, p. 25. London, 1854.

† No man should be allowed to go into anything like severe training whose weight is not in due proportion to his height, and whose vital capacity is not normal (see tables in section on Phthisis). Moreover, his chest ought to have the minimum girth of 36 inches, and there must be no tendency to tubercular phthisis, either hereditary or acquired.

bed should be free from drapery, while it ought to be placed in a good-sized room—not in such cupboards as one sees at some colleges. There must be sufficient, but not too much clothing; while a hair mattress is serviceable, a feather bed being only fit for an effeminate milksop. The feet are to be kept warm and the head cool. If there be restlessness, it may be relieved by a tepid sitz-bath a few minutes before retiring for the night; or in any case, the skin ought to be briskly rubbed with a coarse towel. From eight to nine hours of sleep will be needed. Then, on rising, a cold or tepid sponge bath had better be employed, unless sea-bathing or a plunge in the river can be enjoyed, with a good swim for five minutes. The hair is to be kept short, and the teeth are to be well cleaned night and morning; and while flannel is to be worn next the skin during the day, only a cotton shirt must be slept in. In having recourse to dumb-bell exercise, the best authorities recommend that the weight of the dumb-bells should be in proportion to that of the individual using them as pounds to stones. Thus, a man of ten-stone will select instruments each weighing five pounds. Their use gives flexibility and tone to the muscles, and promotes general activity. For club exercise, wooden bats are to be selected about two feet in length, and each having a weight of from three to nine pounds, according to the strength of the individual. When rowing men are in training for a race it is advantageous for them to take walking and running exercise in the fresh morning air. Running judiciously practiced is especially useful, since by it the man gains both muscular and respiratory power. But it is important that too much be not attempted at first; the speed should be increased very gradually and only as power is gained to permit of the requisite pace without distress. For either running or walking, woollen socks of a proper size are to be worn. The boots or shoes ought not to be new; their upper leathers are to be light, while the soles should be double and water-tight, and care must be taken that there is sufficient length and breadth in the tread, as well as across the toes. It is simply from inattention to points like these that men get tender feet, sore shins, and blistered heels. On commencing a pedestrian tour a short journey is to be taken the first day, the novice gradually increasing the distance until he can accomplish his twenty or five-and-twenty miles a day. The rate should be about three miles an hour, allowing regular intervals for rest and meals. A good bracing air is to be selected, remembering that the athletes of ancient Rome were trained in localities reputed to be the most healthy in the country. A party of three congenial friends will be all that is desirable; for desultory practice soon ends in disgust, and who can find more than two companions with whom he is likely to happily end a tour of some weeks' duration? And lastly, the diet ought to consist of stale bread or dry toast and fresh butter; black tea, with half milk; oatmeal porridge, if liked; white fish, mutton chops, steaks, roast beef and mutton, poultry, game, lightly cooked eggs, light suet puddings, potatoes, watercresses, &c. Pure bitter ale or table-beer, without spirits, will be necessary, or the invigorating Hungarian, French, or German wines may be substituted for malt liquors. All made dishes and rich sauces and pastry ought to be excluded. Breakfast had better be taken at eight o'clock, dinner at two, and supper at half-past seven or eight. There should be complete rest on the Sundays. And each one of the party is to remember the motto of training,—"Soberness, temperance, and chastity."

In concluding these remarks, the reader may look for some information as to the drugs which are useful in conquering hypochondriasis. But on this head I would rather give a word or two of caution than a long list of useless remedies. In the first place, all purgative medicines are injurious.

The action of the bowels must be maintained by exercise and diet. Secondly, narcotics and sedatives only increase the mischief and check the secretions. In some of the books on training which I have seen, sweating liquors are recommended containing opium in such doses as can only produce a violent sick headache for four-and-twenty hours after being taken. Thirdly, tonics are seldom of more than temporary benefit. If there be anæmia, however, some preparation of steel may be given; or if there be great depression of the nervous system, the hypophosphite of soda and bark (F. 419) may be tried, or the nitro-hydrochloric acid with small doses of strychnia (F. 378). Cod-liver oil will prove serviceable when the hypochondriac is below his normal weight. Yet the chief point is for the practitioner to inspire his patient with confidence; failing to accomplish this, all else will be unprofitable. Though the sufferer neglect to attend to the necessary rules, nevertheless, as old Burton says, "It behooves a good physician not to leave him helpless. But most part they offend in that other extreme, they prescribe too much physic, and tire out their bodies with continual potions to no purpose."* The physician of the present day, however, ought not to render himself amenable to this censure.

XX. NEUROMA.

By the term Neuroma [*Νεῦρον* = a nerve] is designated a tumor connected with a nerve. The growth may be solid or cystic; the former being the most frequent. The solid growths are of a fibrous nature, consisting of dense plastic matter, implicating the neurilemma and nerve-fibres. Occasionally the nerve-fibres are merely spread over or around the tumor, without being involved in its texture.

Neuromatous tumors sometimes form spontaneously, in which case they are generally single and very painful; it being remarkable that the suffering is much less when there are several tumors on the same or on an adjoining nerve, than when there is only one. They are also an occasional result of a wound or other injury; and thus they are apt to be produced on the extremities of nerves after amputation.

Every now and then small cancerous masses become deposited in the course of a nerve, and thus simulate the disease under consideration. But true neuroma is of a benign nature. So again the presence of a painful subcutaneous tubercle may lead to an incorrect diagnosis. These little bodies, however, are situated immediately beneath the skin, are seldom larger than a pea, and are formed of dense fibro-cartilage; while although sometimes very sensitive to the touch, they are rarely as painful as the tumors developed in the nerves.

Idiopathic neuromatous growths vary in size from a barleycorn to a good-sized melon. They occur most frequently on the spinal nerves, the branches of the ganglionic system being very rarely affected. Their growth is steady but slow. They are of an oval or oblong form, the long axis corresponding with the direction of the nerve to which they are connected. They may be due occasionally to neuritis, but often no appreciable cause can be detected. A single growth is frequently the origin of agonizing darting pain; which is increased by any attempt to move the tumor in the direction of the nerve. Neuroma has been the antecedent of epilepsy in several

* The Anatomy of Melancholy. Tegg's Edition, p. 801. London, 1845.

recorded cases. In the only instance of nerve-tumor which has fallen under my own observation it produced severe hypochondriasis.

In traumatic neuroma the growth is generally single; and is the source of paroxysmal pains of great severity, often comparable to a galvanic shock. Complete division of a nerve seems especially to produce this variety; in which case the tumor is solid, not invested by the neurilemma, and is destitute of any distinct capsule.

No mode of treatment proves effectual but excision. The only question for consideration is whether the growth should be carefully dissected out, or the neuroma and its corresponding portions of nerve be excised. Dr. Robert W. Smith, in his excellent monograph on this disease, remarks that "the annals of surgery furnish numerous instances in which the excision of the neuroma, along with the corresponding portion of the nerve, has been followed by complete and permanent success. . . . . Experience has further established that neither sensibility nor the power of voluntary motion are, of necessity, ultimately lost in consequence of the excision of even several inches of some of the largest nerves in the body."* This latter observation can hardly be correct, though a fair allowance be made for the looseness of the phrase "several inches." But allowing that there is an element of truth in it, conceding as I do that simple division of a nerve will often be followed by restoration of nervous power in the course of three or four weeks, and that even a small portion of a nerve may be removed without ultimate detriment, yet there must always be an element of doubt about the result. Moreover, where a portion of nerve-tissue (say from one-fourth to half an inch) has been cut away, some four or five or more months will elapse before sensibility and motion are restored to the parts supplied by it. Consequently, when possible, the neuromatous tumor should be dissected out; or, if complete excision be resorted to, the two ends of the divided nerve had better be brought into apposition by a suture. After the removal of a neuroma from the median nerve at the middle part of the arm, and the excision of the nerve itself to the extent of about two-thirds of an inch, M. Nelaton united the two cut ends by a suture. No ill-result followed, and at the end of forty-three hours there was a return of sensibility and motion. Supposing there are several neuromatous tumors, it will be very unwise to interfere with them.

XXI. NEURITIS.

Inflammation of a Nerve, or Neuritis [*Νεῦρον* = a nerve + terminal *-itis*], is an affection which seldom comes under the notice of the physician. For although it can perhaps arise spontaneously in gouty or rheumatic subjects, yet it is much more frequently due to a bruise or wound, or to inclusion of some branch by a ligature in taking up a wounded artery.

The neurilemma is the tissue usually affected. The sciatic nerve is more frequently attacked than any other; and next, the branches of the brachial plexus. The special symptom of this disorder is severe and darting and remittent pain, extending along the trunk of the nerve and its ramifications. The constitutional disturbance varies according to the size of the inflamed nerve; but there is generally more or less fever, with great restlessness at night. In chronic cases, the symptoms are those of neuralgia.

* On the Pathology, Diagnosis, and Treatment of Neuroma, p. 7. Dublin, 1849.

The chief remedies in gouty or rheumatic neuritis, are iodide of potassium and colchicum and aconite. In all cases, the affected part must be kept very quiet; while it ought to be freely covered with belladonna and water-dressing, or with linseed poultices containing the extract of poppies. The chronic form usually yields sooner to quinine than to any other drug.

XXII. NEURALGIA.

1. **INTRODUCTION.**—The pains which occur in the course of disease may be divided into two varieties: *i. e.*, into those occurring at the seat of mischief—as pain in the breast from cancer of the mamma, pain in a joint from inflammation of the synovial membrane, pain in the sciatic nerve from disease of the neurilemma, intercostal neuralgia from herpes of the same side; and those referred to parts not actually the seat of morbid action, as pain over the eyebrow from decayed teeth, pain through the shoulder from disease of the liver, pain down the left arm from angina pectoris, pain darting along the little finger from striking the ulnar nerve at the elbow, pain in the knee from disease of the hip, pain in the heel from disease of the bladder, and pain about the foot from piles or from stricture of the urethra, &c.

Neuralgia [*Νεῦρον* = a nerve + *ἄλγος* = suffering] consists of violent pain in the trunk or branches of a nerve, occurring in paroxysms, at regular or irregular intervals: frequently there are nocturnal exacerbations. It may attack the nerves of the head, trunk, or extremities; the subcutaneous nerves of these parts suffering the most frequently.

2. **VARIETIES.**—When the branches of the fifth pair of nerves are the seat of the pain, we call the disease *neuralgia faciei* or *tic douloureux;* when certain nerves about the head—*hemicrania;* when the sciatic nerve—*sciatica.* There are authorities who consider that *angina pectoris* is a neuralgic affection of some of the cardiac nerves; and *gastrodynia* a similar disease of the nerves of the stomach. The pain in dysmenorrhœa is at times neuralgic.

Tic Douloureux, or facial neuralgia, may affect either of the three chief branches of the fifth pair of nerves. Where the pain depends upon a morbid condition of the first or ophthalmic branch, the frontal ramification of it (the supra-orbital nerve) is that most frequently attacked; the suffering being referred chiefly to the tissues of the forehead. Supposing that the second or superior maxillary branch is the seat of the complaint, the infra-orbital nerve will be one of the most commonly affected; the symptoms consisting of excruciating pain shooting over the cheek, lower eyelid, alæ of the nose, and upper lip. Tic douloureux of the third or inferior maxillary branch is generally confined to the inferior dental nerve, especially to that portion of it which emerges from the mental foramen and extends to the lower lip. The pain is referable to the lower lip, the alveolar process, the teeth, the chin, and the side of the tongue.

Whichever nerve may suffer, the torture is almost always confined to one-half of the face. The right infra-orbital nerve is the most frequent seat of this disease. The pain comes on usually very gradually—perhaps as a momentary twinge; yet soon it increases in severity, gets lancinating and burning, and often becomes excessive and intolerable. I have seen the most horrible sufferings induced; and until I became aware of the value of

chloroform, have often been unable to afford relief. Not unfrequently the attack is preceded by nausea with derangement of the digestive organs, sometimes by dyspnœa, and occasionally by slight rigors followed by heat: ofttimes there is no harbinger of any kind.

Facial neuralgia can be produced by many different conditions. Thus, it may arise from general debility, owing to simple anæmia or renal disease; from disease of the bones of the face; or from some tumor or other organic disease of the brain. Frequently the affection can only be regarded as a product of hysteria in an irritable constitution; sometimes it is intermittent and periodical, appearing to be due to the poison of malaria; in many cases it seems to be dependent on disordered digestive organs; while in not a few it cannot be traced to its real source.

But of all the causes of tic douloureux I believe none to be so frequent as some morbid condition of the teeth.* The disease affecting these organs may be of the nature of caries, or necrosis, or exostosis of the roots; or of inflammation or exposure of the dentinal pulp; or of disease of the periosteum with suppuration. Even the presence of supernumerary teeth, with overcrowding of the jaw, will induce headache or tic douloureux in sensitive subjects. In all cases of neuralgia, therefore, the mouth should be carefully examined, so that any decayed teeth or stumps may be extracted. And it is important to remember that the pain may have its origin in the dental branches of the superior maxillary nerve (the second division of the fifth), without there being any toothache; a point which is frequently incomprehensible to the patient, especially to the one who is unwilling to be convinced. Moreover it does not follow that there is no organic disease, because the neuralgia assumes a periodical form. Many cases have been recorded where some nerve in one of the extremities has been irritated by a tumor or an aneurism, and yet the paroxysms of pain have occurred with all the regularity of an ague; ofttimes ceasing for a long interval, but generally returning again and again until the cause has been removed. Where exostosis takes place in apparently sound teeth, it will be difficult to fix upon the source of the suffering; though frequently there is sufficient tenderness about the gum to remove all doubt. An extraordinary example of dental exostosis has been related by Mr. Fox:† A young lady, scarcely twenty years of age, had suffered for more than a year from deepseated pains in the face, teeth, and gums. The pain had gradually extended to all the teeth; and one by one those of the lower jaw, with the exception of the four incisors, had been removed. During this time every kind of treatment had been resorted to, without any alleviation. When Mr. Fox saw

* The importance of investigating the state of the mouth in all cases of neuralgia about the face and head, headache, deafness, amaurosis, facial paralysis, epilepsy, abscess of the antrum, and hypochondriasis, cannot be too strongly insisted upon. The teeth are divided into incisors, canines, bicuspids or premolars, and molars. A representation of the number of the different kinds of teeth in both jaws by means of symbols, constitutes what is called a "dental formula." The number and nature of the permanent teeth of man are thus expressed in the convenient signs put forward by Professor Owen:

$$i.\ \frac{2-2}{2-2};\ c.\ \frac{1-1}{1-1};\ p.\ \frac{2-2}{2-2};\ m.\ \frac{3-3}{3-3} = 32.$$

The formula for the deciduous, temporary, or milk teeth is as follows:

$$d\ i.\ \frac{2-2}{2-2};\ d\ c.\ \frac{1-1}{1-1};\ d\ m.\ \frac{2-2}{2-2} = 20.$$

† The Natural History and Diseases of the Human Teeth. Second Edition, part ii, p. 45. London, 1814.

her she was only able to take fluid nourishment, the teeth of the upper jaw being so tender that the slightest touch caused extreme pain. There was a constant flow of saliva from the mouth; while the sight of one eye was affected, and the lids had been closed for two months. The first molar of the upper jaw, on the side of the affected eye, was extracted. The fangs of this tooth were much enlarged and the periosteum thickened: its removal gave relief, and in two days the eye could be naturally opened. The relief, however, was partial; and a perfect cure was only ultimately effected by removing all the teeth. Mr. Tomes* mentions the case of a lady who had suffered from tic douloureux for some years. The crowns of the teeth were sound: nevertheless when extracted, the fangs were found to be enlarged from exostosis. The disease was not cured until the whole of the teeth in the upper jaw had been removed. And lastly, Mr. Catlin† has recorded the very singular instance of a lady who had consulted him concerning a diseased right molar. For three months she had suffered acute pains in the tooth, ear, and side of the neck. When he saw her she had been deaf for four days. The inflamed tooth was extracted, and hearing returned within an hour after the operation.

In a person liable to neuralgia, the paroxysms of suffering are induced by very trifling causes, a slight current of air, a sudden jar or shake, or anything which reminds the patient of his malady, frequently sufficing to bring them on. The pains often prevent all attempts even at repose. When the sufferer is once asleep, however, the rest is sound and undisturbed, since the pains, as pointed out by Sir B. Brodie, are suspended by sleep.

β. *Hemicrania* [*Ἡμισυς* = half + *κρανίον* = the skull] is merely headache affecting one side of the brow and forehead. It is often attended with sickness, and more frequently results from debility than from any other cause. Occasionally its attacks are periodical, coming on at a certain hour every day. It has been called *sun-pain*, from the circumstance that at times it continues only so long as the sun is above the horizon.

γ. *Sciatica* [*Ἰσχίον* = the hip] consists of acute pain following the course of the great sciatic nerve, extending, therefore, from the sciatic notch down the posterior surface of the thigh to the popliteal space, and frequently along the nerves of the leg to the foot. It very often results from pressure upon some part of the nerve, such as can be produced by intestinal accumulations or by simple or malignant uterine tumors. Now and then, too, this disorder arises from inflammation; sometimes from overfatigue and exposure to cold and wet, and occasionally from rheumatism. Puerperal women (especially those of a rheumatic or gouty diathesis) not uncommonly suffer from sciatica, the nocturnal exacerbations of pain quite preventing sleep and exhausting the patient.

Usually one limb only is affected, examples of bilateral suffering being uncommon. The muscles feel stiff and as if their action were impeded, so that the patient is obliged to limp along with the aid of a stick. The duration of an attack of sciatica varies from a few weeks to several months; the middle period of life, from forty to sixty, is most obnoxious to it, and occasionally seizures of it alternate with other rheumatic or neuralgic affections.

3. **TREATMENT.**—In the treatment of neuralgia, it is obvious that our first efforts must be directed to the removal of the cause. So long as this

* A System of Dental Surgery, p. 441. London, 1859.

† The Teeth in Health and Disease. By Robert Thomas Hulme, F.L.S., &c., p. 211. London, 1864.

remains we may relieve, but not remove, the effect. The state of the health will have to be looked to. It may be laid down as an axiom that this is always below par. Aperients will perhaps be needed, but they are to be of a mild kind, such as we possess in the various preparations of aloes (F. 155). Of course any accumulations in the rectum or colon are to be removed by more active purgatives and enemata (F. 190). Then the constitutional debility ought to be corrected by a nourishing diet. I generally forbid the use of tea and coffee, but allow plenty of milk, raw eggs, animal food twice daily, with a regulated amount of malt liquor or some alcoholic stimulant. Cod-liver oil is almost as necessary as good food,—in point of fact it is an excellent food. Warm clothing should be recommended, and especially the use of flannel next the skin. In sciatica, chamois-leather drawers often prove very comfortable. The employment of a salt warm or tepid bath every morning, followed by friction, will be beneficial.

Ferruginous tonics frequently prove of great value. Dr. Elliotson says that, "in all cases of neuralgia, whether exquisite or not, unaccompanied by inflammation, or evident existing cause, iron is the best remedy. The officinal hydrated peroxide may therefore be given in from five to thirty grain doses two or three times a day, with an occasional aperient. Quinine and steel (F. 380), or the reduced iron (F. 394), can also be recommended. When there are symptoms of disorder of the digestive organs, pepsin (F. 420), or rhubarb and ipecacuanha (F. 179), are indicated. If there be nausea or heartburn, antacids (F. 63, 65) often give great relief. Cases associated with rheumatism will derive benefit from iodide of potassium, aconite, arnica, actea racemosa, colchicum, and occasionally from turpentine, &c., while those in which the attacks are periodic can generally be cured by full doses of quinine (F. 379, 383), or by minute doses of arsenic with bark, zinc, &c. (F. 52, 381, 399).

The efficiency of the valerianate of ammonia as a remedy for neuralgia, has been urged by many practitioners, though I must confess it has greatly disappointed my expectations. From ten to eighteen or twenty grains of this salt may be given, in two ounces of infusion of orange-peel or calumba, thrice daily (F. 410). No stronger proof of the intense suffering which is produced by neuralgia could be given than is instanced by the fact that patients will take this most nauseous draught for weeks, if it only afford them moderate relief. From time to time I have seen benefit produced by the chloride of ammonium, thirty grains of which should be administered every hour in plenty of water, while the paroxysm is on. If, after the fourth dose there be no diminution of the suffering, it will be useless to persevere. As soon as the pain is relieved, the dose can be reduced to fifteen grains three times a day.

With regard to the treatment of sciatica, mercury or iodide of potassium will be needed if there be any symptoms of a syphilitic taint; active purgatives, especially croton oil (F. 168, 191), where we fear the existence of fecal accumulations; and steel, with cod-liver oil (F. 389), if there be general debility. In two or three case where I could detect no cause for the disease, a cure has been effected by the sulphate of soda and steel (F. 181), with the use twice a week of a sulphur or hot air bath.

Certain topical expedients have been proposed. Division of the affected nerve is an unreasonable operation, which can rarely, if ever, be of lasting service. Supposing there is a tumor or foreign body pressing upon the nerve, it ought to be removed; or any portion of necrosed bone that may be the cause of the suffering must be taken away. In facial neuralgia, the extraction of carious teeth, &c., as already dwelt upon, will repeatedly effect a cure. An irritable condition of the dental nerves, which I believe

to be the cause of much suffering, can be remedied in men by the cultivation of the mustache and beard. A clergyman who looked forward to his winter attack of bronchitis as a matter of course, not only destroyed the susceptibility to this foe by throwing away his shaving-brush and razors, but gave me great praise for having also completely cured his frequent pains and aches about the jaws by my recommendation. Again, wherever the neuralgia may be seated, belladonna, veratria, aconite, or opium (F. 297, 304), applied to the affected part, will often at least palliate the suffering; while, in some instances, the cuticle can be removed by a blister, and the part dusted over with one or two grains of morphia mixed with the same quantity of white sugar. A small portion of an ointment, made by mixing one or even two grains of aconitin with sixty grains of lard (F. 296), may be cautiously smeared over the track of the painful nerve once or twice a day. Narcotic injections into the subcutaneous areolar tissue are now very commonly employed. Morphia with atropin forms, perhaps, the best compound, since it allays pain without causing sickness (F. 314); while as much relief is given by using this hypodermic method at a distance from the seat of pain, as by practicing it at the neuralgic part. To inject the solution, a graduated syringe having a sharp perforated nozzle ought to be used. From time to time, however, cases are met with where the agony is intensified by any preparation of opium. Of this I am certain, having particularly noticed the harm I have temporarily done by opium and morphia given by the mouth or subcutaneously. In all such instances, I now find no remedy so valuable as a mixture of atropin and arsenic (gr. $\frac{1}{10}$ of the former, with gr. $\frac{1}{30}$ of the latter, in five minims of water) used hypodermically. Once or twice quinine has been used in place of the arsenic, but the latter has seemed most useful. So also warm baths, or hot douches of medicated water, or douches of hot and cold water alternately, will often be useful; though, if the pain be of a burning character, the patient will voluntarily apply cold water constantly, and will refuse to adopt any other practice. Yet in these cases, repeated blistering of the heated part, taking care to keep the surface sore for a time, will often have an admirable effect. Shampooing, the parts being very gently kneaded at first until they acquire a certain amount of tone, can be tried. And then, where there is no disease of the nervous centres, and where the affected nerve is not irritated by inflammation or by the pressure of some morbid growth, the use of a continuous current of galvanic electricity (such as can be obtained from one of Pulvermacher's chains) may diminish the morbid exaltation of sensibility and so lead to a cure.

Not unfrequently the practitioner will be summoned to give some mitigation of suffering at once, without any reference to a cure. When the pain is on severely, when the patient is racked with torture, no agent produces such instantaneous relief as ether or chloroform (F. 313); the inhalation of one of which remedies, or of the two combined, should be permitted until complete insensibility is produced. On many occasions it will be found advisable to give fifty or sixty drops of the spirit of ether in water, or in brandy and water, just before the respiration of the vapor is commenced; or a large dose of quinine (from 5 to 20 grains) may be administered, provided there are no symptoms indicative of cerebral or cardiac disease. The ease thus induced generally continues long after recovery from the immediate effects of the inhalation. For the relief of a violent attack, however, it is often advisable to inject subcutaneously, while the patient is under the influence of the anæsthetic, a dose of morphia and atropin, or of atropin and arsenic, or of atropin and quinine, where none of this last drug has previously been given by the mouth.

PART V.

DISEASES OF THE ORGANS OF RESPIRATION AND CIRCULATION.

I. CATARRH.

CATARRH [from *Καταῤῥέω* = to flow down little by little] consists of an acute or subacute inflammation of the mucous membrane of some part of the air-passages. It is called *coryza* [*Κάρα* = the head + *ζέω* = to boil], or *nasal catarrh*, if it affect the Schneiderian membrane of the nose; *gravedo* [*Gravis* = heavy], if the frontal sinuses suffer; *laryngeal catarrh*, when the larynx is involved; and *bronchial catarrh*, when the stress of the disease falls upon the trachea and bronchial tubes.

Catarrh is the commonest of diseases. It arises not from mere cold, but from too sudden a change of atmosphere, or from exposure to wet, &c., when the strength is exhausted. Sudden vicissitudes of temperature are not dangerous; for in the use of the Turkish bath a cold douche is commonly employed after leaving the sudatorium, while Dr. Currie and others have related many cases of fever, scarlatina, &c., which have been beneficially treated by cold affusion during the hot stage. The application of cold is only dangerous when the heated body, exhausted by exercise, is rapidly parting with its caloric. Under other circumstances, the glowing system can react upon the cold, and convert it into a strengthening rather than a depressing agent; but the frame which is quickly cooling after having been overwarmed is not in a condition to react, and hence the application of cold increases the depression.

The *symptoms* of catarrh chiefly consist of lassitude, pains in the limbs, aching of the back, and a sense of tightness across the forehead; these effects being quickly succeeded by excessive discharge from the nostrils, profuse lachrymation, hoarseness and sore throat, furred tongue, more or less feverishness, thirst with loss of appetite, and a quick pulse. An eruption of herpes also appears upon the lips; and perhaps most frequently about the angles, or the middle, of the lower lip. At the end of some forty-eight hours these symptoms begin to subside; or the disease passes into a more severe affection, such as acute tonsillitis, bronchitis, pneumonia, &c.

Attacks of catarrh are apt to recur, on slight causes, in many susceptible subjects. Occasionally the disease appears to get chronic, but this seldom happens when the system is strong. As the mischief leaves the mucous membrane of the nostrils the trachea or bronchi may become affected. When this happens the feverish symptoms get aggravated, while a frequent irritating cough results. Moreover, in catarrhal inflammation of the trachea there is often dysphagia, which at times is so severe for a day or two as to give rise to suspicions of grave disease. But independently of the fact that the pain soon ceases under simple treatment, there is an absence of all the usual

symptoms of stricture of the œsophagus, aneurism, cancer, &c. The uneasiness is only felt during coughing or at the moment of deglutition, whether the substance passing consist of food or merely of saliva, and it is often referred by the patient to the top of the sternum. It is probably due to the stretching of the inflamed windpipe which takes place at the time of swallowing. There is commonly dysphonia, sometimes complete aphonia, in these cases.

Dr. Hyde Salter has suggested that the symptoms of catarrh depend upon a specific animal poison, and that they are attributable either to the material presence of this poison circulating in the blood, or to the irritation which it produces in those organs which are its constituted eliminants. The arrest of the function of the skin from exposure to cold throws back into the circulation that which ought to have been eliminated as the cutaneous excretion; and this, either by itself or by ulterior changes which it gives rise to in the blood, induces a condition of toxæmia. The vicarious emunctory for the correction of this state of blood-poisoning, by the elimination of the material for whose excretion the skin has been temporarily rendered unequal through cold, is the respiratory mucous membrane, and the principal local symptoms—coryza, tonsillitis, bronchitis—depend upon the vascular changes in this membrane induced by such exceptional excretory function, and possibly by the irritation of the poison materially present thereat. So long as the blood is thus contaminated, the fever symptoms persist, while its depuration is immediately attended by their abatement.

No one applies to a doctor to cure a simple cold. Every man acts as his own physician, and judiciously amuses himself with slops, putting his feet in hot water, and perhaps by taking a few doses of James's powder; the disease meanwhile running its course, and in three or four days exhausting itself. Doubtless the cure can sometimes be expedited by a mild aperient in the morning after a ten-grain dose of Dover's powder has been taken at bedtime, or possibly by the administration of a few saline draughts (F. 348). A hot air or vapor bath may often do good. In some persons an opiate at bedtime (fifteen or twenty minims of the liquid extract of opium, with one or two drops of chloroform) will cut short a catarrh; while in others, a good dinner and two or three extra glasses of wine may have the same effect. In coryza, an immediate cure is said to result from the inhalation of iodine vapor every three or four minutes for an hour, each inhalation lasting one minute, and being accomplished by merely holding in the warm hands a bottle of the tincture under the nose. Dr. C. J. B. Williams assures us that any cold can be cured in forty-eight hours or less by almost total abstinence from liquids; but it is a practice which in all probability very few have adopted, though it was originally recommended about one hundred and forty years ago by Dr. Richard Lower.

II. CHRONIC INFLAMMATION OF THE NOSTRILS.

Chronic inflammation of the nostrils, or ozæna [ὄζη = a stench], or rhinorrhœa [ῥίν = the nose + ῥέω = to flow], is attended with heat and stiffness of the nose, tumefaction of the Schneiderian membrane, and an offensive sanious or muco-purulent discharge.

Causes.—This disease may result from repeated or long-continued at-

tacks of acute inflammation, or of common catarrh, being especially apt to do so in such as are of a delicate constitution. It may also be a consequence of the strumous or gouty diathesis, when it is generally associated with disordered digestive organs. And again, it not uncommonly depends upon a syphilitic taint.

Diagnosis.—In every case of ozæna the nostrils should be examined with a probe and a nasal speculum, to be certain that the symptoms are not dependent on any impediment (as a foreign body, piece of necrosed bone, or a polypus) to the free discharge of the nasal mucus; since, if this secretion be allowed to accumulate, it soon putrefies and excites troublesome inflammation.

It is astonishing what extraordinary substances children sometimes push into the nasal fossæ. Shells, cherrystones, pebbles, beans, pieces of slate-pencil, &c., have been removed by me, after they had been causing an offensive discharge for months.

Rhinoliths [Ῥὶν = the nose + λίθος = a stone] sometimes form in the nasal cavities, these concretions consisting of the phosphate and carbonate of lime, magnesia, and mucus. A portion of necrosed bone, or some foreign body introduced from without, usually forms the nucleus. In a rhinolith which I extracted in 1862 the nucleus consisted of a shell, and the patient assured me that this must have been introduced at least thirty years previously.

Abscess of the septum will also give rise to an offensive purulent discharge, which may continue for some time in strumous subjects. It almost always causes perforation of the septum. Where there is a polypus, the necessity for its complete removal is to be remembered. Even after perfect extirpation, a gelatinous growth of this kind often forms again and again.

Where the cause of the symptoms is obscure, the posterior recesses of the nostrils ought to be examined by the rhinoscope; so that the condition of the turbinated bones, or the seat of any tumefaction or ulceration, or the glistening form of a polypus, may be reflected in the little glass or steel mirror, after it has been passed to the back of the pharynx with its bright surface turned upwards. The throat is to be illuminated by the reflector fixed on the practitioner's forehead; the mirror throwing the rays of light upwards and forwards into the posterior nares, while it receives the reflection of this region. Like the practice of laryngoscopy careful manipulation is necessary to obtain a good image.

Symptoms.—The symptoms of ozæna vary somewhat according to the cause. Usually they come on insidiously with the indications of an ordinary cold; there being especially great uneasiness or "stuffiness" in the nose, owing to the thickened mucous membrane impeding the passage of the air. A portion of the Schneiderian or pituitary membrane may even swell, so as to look like a polypus on a superficial examination. There will be also frontal headache, cough, general weakness, and much mental depression; but the most troublesome symptom consists of a profuse and mephitic muco-purulent discharge. Sometimes this discharge is quite purulent; while it is generally tinged with blood, if there be any ulcer on the mucous membrane. Large solid flakes of fibrin or of hardened mucus occasionally come away. The smell from these crusts, owing to the rapidity with which they decompose before they are expelled from the nasal fossæ, is so very offensive, and taints the breath to such an extent, that the patient is unable to go into any society. He becomes even an object of disgust to himself; and if medicine should fail to give relief, he gets miserable and desponding, has a complete want of appetite, loses flesh and strength, and passes

wretched restless nights. When the disease has continued some time, the septum of the nose often gets eaten through; or the spongy bones become implicated, and there is troublesome caries or necrosis. This is especially likely to happen when the system has been long tainted with the poison of syphilis.

Occasionally the symptoms in ozæna are very slight. The patient (most probably a strumous subject) is merely annoyed by an uneasy feeling in the nose, and especially by finding that whenever he uses his handkerchief, he brings away thin mucus stained with blood. Advice is seldom sought until this has continued some time; and it is then perceived on examination, that a circular hole, with abraded margins, perhaps large enough to admit a goose-quill, has been eaten through the septum nasi. The hole never closes. These cases are in no way connected with any venereal taint.

Treatment.—The remedies must be local and constitutional. Remembering that the fetor of the discharge results, in part at least, from the decomposition of the retained mucus, we shall take care to have the nostril frequently and effectually syringed with warm water; to which some alum or zinc, or a solution of permanganate of potash (gr. 5–20 to a pint of water), or a small portion of chloride of zinc (gr. 12 to water fl. oz. 16), can often be very advantageously added. I have seen cases where a large syringe has had to be used for half an hour at a time, in order completely to dislodge the inspissated matter; for unless the whole is removed no relief will be given. To moderate the secretion subsequently, the nitrate of mercury ointment (one part to four or six of lard) should be applied up the nostril by means of a camel's-hair pencil every night; or the glycerin of carbolic acid can be tried in the same way every eight or twelve hours. Atomized medicated fluids (F. 262) also do good service in these cases. Powders of subnitrate of bismuth, of chlorate of potash and sugar (thirty grains and half an ounce), or of red oxide of mercury and sugar (five grains and half an ounce), sniffed up the nostril twice or thrice daily, have been recommended by M. Trousseau and others; but they are less efficacious than injections, where there is hardened mucus, while it is not always that we can get them thoroughly applied. Tannic acid used as a snuff, as well as the high-dried Scotch snuff itself, will sometimes destroy small mucous polypi, possibly by causing them to shrivel up and degenerate.

Supposing the case to be one of catarrhal ozæna, in addition to injections or snuffs, attention ought to be paid to the digestive organs; and then such tonics as quinine and iron, the nitro-hydrochloric acid and bark, steel with arsenic, cod-liver oil, and a nourishing diet, will prove the most appropriate constitutional remedies. A few doses of blue pill and rhubarb may be needed.

In strumous cases, I have found most benefit from the iodide of iron and cod-liver oil, or from iodine and arsenic, together with the frequent injection of warm water. The inhalation of steam, medicated either with iodine (F. 259), or creasote (F. 261), or turpentine (F. 260), is very useful. Change of air, especially to a bracing part of the coast, often does great good.

The treatment of syphilitic ozæna is locally the same as for the other forms; while the constitutional remedies are those of secondary syphilis generally. The mercurial vapor bath (F. 131) proves especially useful in these instances.

III. APHONIA.

Aphonia [Ἀ = priv. + φωνή = the voice] is found to vary in degree from a slight impairment of the voice to complete dumbness. The loss may be temporary or permanent; and it may be due to functional disorder, or to structual change in the muscles and other tissues of the larynx and glottis. Occasionally there is disease in the nervous centres, producing spasms or paralysis of the muscles, which act on the vocal cords.

Of the *functional* variety, aphonia from hysteria and debility may be selected as the type. The diagnosis of this form is for the most part easy enough, since it is generally allied with other symptoms indicative of its nature. In women the uterine functions are usually disturbed, irritation of one or both ovaries being often present. Sometimes there is amenorrhœa, sometimes menorrhagia; but the former is more frequent than the latter. Leucorrhœa is commonly complained of. Now and then there is chlorosis.

The patient usually speaks in a whisper for days together. Then the power of the voice returns, but there are generally many relapses. In a fashionable school, where the studies were principally devoted to the so-called accomplishments, three out of eight of the pupils suffered from occasional attacks of aphonia. In two of the cases the disease was hysterical, the mind exercising some influence upon the laryngeal nerves, such as is seen in loss of voice from any sudden or violent emotion. But in the third instance the affection was simply feigned; the young lady being capricious and wayward, though in good health. Galvanism, moral influence, and ferruginous tonics cured all the patients; enabling the victims to become the masters of their nerves.

Aphonia from fright or shock may occur in men as well as in women. Deputy Inspector-General Longmore has related an interesting example of complete loss of speech from nervous shock.* The chief points in the case are as follows: A stout, healthy soldier of the Dragoon Guards was struck just below the centre of the lower lip, by a small matchlock-ball weighing nearly one ounce, during a charge of his regiment at the action of Pal-i-chou, near Pekin, on the 21st September, 1860. The bullet penetrated the tissues; carried away part of the alveolar process and four teeth on the left side; travelled downwards behind the symphysis, clearing away the origins of the genio-hyo-glossi muscles in its passage; and became lodged in the soft textures of the floor of the mouth, behind the frænum linguæ. The power of articulation was immediately lost. The ball was extracted from within the mouth on the twenty-third day. On examination at Fort Pitt, soon after his return home, the inferior maxillary bone was found a little thickened at the seat of injury. The tongue was somewhat wasted, and its movements rather limited; but there was no evidence of muscular paralysis, and no impairment of taste or sensation. Subsequently to his discharge from the service he was watched, but the dumbness continued. At the end of July, 1862, thirteen months after becoming a pensioner, he suddenly recovered his speech while in a state of excitement, during an altercation in a public-house. Dr. Aitken attributed the loss of speech in this case to the injury of the insertions of the genio-hyo-glossi muscles, and to the probable disturbance of the ninth pair of nerves by the inflammation excited. Mr. Longmore objects to this view, on the ground that if it were

* Statistical, Sanitary, and Medical Reports for the Year 1861. Army Medical Department, p. 461. London, 1863.

the power of articulation should have been recovered gradually, as red parts were restored to health. He attributes the dumbness to rous shock; classing it with those cases of temporary aphonia that om hysteria, fright, &c., and in which the recovery is often sudden. n hysterical or any form of functional aphonia is of long continu- ıe vocal cords may become flaccid or powerless, just as happens vere loss of blood, an acute attack of fever, diphtheria, &c. Many es of debility or paralysis of the adductor muscles of the vocal cords, on attempted phonation the cords could not be approximated, have ported by Dr. Morell Mackenzie.* Dr. Althaus has related the a woman, aged thirty, who had lost her voice two months before he in May, 1862. An examination by the laryngoscope showed a ic condition of both vocal cords, which were perfectly motionless, etween them a considerable cleft was visible. After two trials of ıation, the patient could speak again, though only in a hoarse whis- 'he laryngoscope then showed that the right vocal cord had to a ıtent recovered, and that it approached the middle line when an ır was made to pronounce a long "ah." By further treatment, the al cord was also restored to its normal condition, and the voice en- ecovered.†

chief causes of *organic* aphonia are inflammation, serous infiltra- ulceration of the mucous membrane about the vocal cords; the ı of morbid growths in or near the larynx; and tubercular or isease of the lungs. The diagnosis of the first two sets of causes ly made by the laryngoscope; the best method of employing this ent being well detailed by Sir George Duncan Gibb,‡ from whose l and interesting volume I have derived much information. The scope consists of a little mirror attached to a flexible metallic stem, ı fixed into a handle of wood or ivory. It varies in size from three lines to an inch and a half in diameter; and is of a circular, oval, l or quadrangular form. Glass are better than steel mirrors, ac- to most authorities. Before introducing the laryngeal mirror ı mouth it should be gently warmed over a spirit-lamp, and the ıture estimated by applying the back of the plate to the cheek. oat is to be illuminated by means of a light thrown into it from ting surface; a proceeding which is accomplished by wearing a phthalmoscopic mirror before the right eye, between the two eyes, he forehead. I have always used the latter, and been well satis- h it; though it is not a matter of much moment which form is . The attachment of the mirror by a ball-and-socket joint to a ectacle-frame, the forehead band, or the mouthpiece of Czermak, of its movement in any necessary direction. The light to be em- for reflection may be natural or artificial; the former comprising d sunlight, and the latter a good moderator-lamp or an argand p, with a plated mirror at the back of the cylindrical glass chim- n sunlight the patient has his back to the window, and the rays eceived in the reflector are thence conveyed to the laryngeal mir-

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rseness, Loss of Voice, and Stridulous Breathing, in relation to Nervo- r Affections of the Larynx. Second Edition, p. 3. London, 1868.

Paralysis, Neuralgia, and other Affections of the Nervous System, &c. lition, p. 154. London, 1864.

Diseases of the Throat and Windpipe, as reflected by the Laryngoscope, &c. dition, p. 445 to 456. London, 1864.—The work of Dr. Morell Mackenzie e of the Laryngoscope in Diseases of the Throat, London, 1865) likewise full and valuable instructions on all matters appertaining to Laryngoscopy.

ror. But, as a rule, artificial light is the best; and the mode of proceeding is then as follows: The patient is to sit erect, with the lamp near his left elbow. His head can be supported on a kind of photographer's rest, if deemed advisable. The mouth ought to be on a level with the nose or eyes of the operator, the flame of the lamp being on a line with the operator's eyes. The position being rendered comfortable, the patient is to protrude his tongue, and with his handkerchief to firmly hold it outwards and downwards; at the same time opening his mouth as wide as possible, and reclining the head a little upwards. The proper focal distance being ascertained by movements of the head forwards, the operator introduces the warmed laryngeal mirror with the right hand, or with his left if he would keep the right free for applying remedies or instruments; gently placing the mirror against the middle of the soft palate and uvula, without touching the tongue or back of the pharynx. The handle of the mirror is to be well kept to the left side of the patient's mouth out of the light, the patient breathing quietly as usual. The back of the tongue with its large follicles first comes into view; then the hollow space between it and the anterior or glossal surface of the epiglottis; next the apex and laryngeal surface of the epiglottis; and then the interior of the larynx, in which is seen an extremely movable antero-posterior fissure, bounded by two brilliant pearly borders, that palpitate with surprising rapidity. This last is the glottis; being formed by the inferior thyro-arytenoid ligaments or true vocal cords, in contradistinction to the false cords which are above the glottis and are formed by the superior thyro-arytenoid ligaments or muscles. Beyond the glottis the trachea is seen; the rings of which are distinctly visible far down, even to the bifurcation, during deep inspiration. In cases where the throat and fauces are unusually irritable a few whiffs of chloroform will sometimes relieve this condition. Dr. Morell Mackenzie says he has found the best effects result from sucking ice for some ten minutes before the mirror is to be introduced. Other physicians have advised about ten grains of the bromide of ammonium to be administered thrice daily, for a couple of days prior to the investigation; inasmuch as this agent seems to deaden the sensibility of the mucous membrane. My own throat is so sensitive that I have only once been able to practice autolaryngoscopy, and this was after taking the iodide of potassium for some days. But usually the first-named salt is preferable to the latter.

In connection with this subject it only remains to notice that for the cure of inflammation and ulceration about the cords the best application (by means of a curved brush) is that recommended by Sir G. D. Gibb, viz., from forty to eighty grains of the crystals of nitrate of silver to the ounce of distilled water. Scarificators are employed for œdema of the glottis, curved forceps for the extraction of foreign bodies, and the wire écraseur for the removal of polypi or other growths. The inhalation of atomized fluids (F. 262) will prove most serviceable in some instances.

Tubercular disease of the lungs, with deposits in the larynx, causing aphonia, is hopeless. The loss of voice only occurs towards the end of the affection, and may be considered as indicating a quickly fatal termination. Aphonia at times, however, occurs in phthisis merely from debility; there being no disease whatever in the windpipe. In such, properly directed treatment will be useful. The laryngoscope will show the nature of the case.

Disease of the brain affecting the pneumogastric nerve may cause paralysis of the muscles of the larynx, on the normal action of which the tension and position of the vocal cords depends. The aphonia thus re-

sulting could never be mistaken for that failure of articulate language (aphemia or aphasia) which is the consequence of disease in the cerebral hemisphere—the seat of mind. A few years ago, I saw at Millbank a prisoner who was completely dumb, and had been so for some months, in consequence (as he believed) of a blow on the back part of the head from a policeman's truncheon. His mind was healthy and active. He had no difficulty in expressing his wishes and ideas in writing. Such was his intelligence, indeed, that by some practitioners this man had been deemed a clever malingerer; though I felt convinced from his general appearance and symptoms that the suspicion was unjust. To remove all doubt, however, he was put carefully but fully under the influence of chloroform; in the conviction that as the anæsthetic effect passed off he would betray himself, if the aphonia were feigned, before perfect consciousness returned. But though he evidently strived to talk, he merely uttered a few guttural sounds, something like those produced by a deaf mute when excited. The laryngoscope was not then in daily use as it is now, or doubtless paralysis of the vocal cords might have been detected.

The difference between aphonia and aphasia (see p. 318) may perhaps be clearly illustrated by what is seen in the case of a man with a cut throat, and comparing the effects with those which result from an aneurism of the cervical portion of the internal carotid artery on the left side. In the case of the cut throat, supposing the trachea to be opened below the glottis, the voice disappears—there is aphonia. There will be no aphasia or loss of the faculty of speech, no mental defect. The man with the wound in his windpipe may in fact speak, and were he deaf he might doubtless imagine that his voice was audible. But there is no voice simply because the current of air which should play on the vocal cords does not reach them. Close the wound artificially, and then there will be both speech and voice. Now in the other instance, the aneurism of the left internal carotid necessitates the application of a ligature to the common carotid. Thus a considerable supply of blood must be cut off from the brain, and especially from that part supplied by the anterior and middle cerebral arteries. The balance cannot be perfectly restored by any compensating enlargement of other vessels. As a consequence of the defective nutrition, softening by and by takes place of the posterior part of the third left frontal convolution; and if this be the convolution of articulate language, as M. Broca maintains, aphasia or cerebral speechlessness must result. The organs of the voice are healthy enough, but the mental faculty of speech has gone forever.

IV. DYSPHONIA CLERICORUM.

Dysphonia [from $\Delta\upsilon\varsigma$ = difficulty or pain + $\varphi\omega\nu\eta$ = the voice] clericorum, or clergyman's sore throat, is frequently a nervous complaint; being unattended, at least in its early stages, by any organic lesion, but consisting rather of hyperæsthesia or irritability of the investing membrane of the fauces. Subsequently, however, a series of important morbid changes take place. These are chiefly congestion, inflammation, or relaxation of the mucous membrane; enlargement of the tonsils; elongation of the uvula; with irritation, inflammation, morbid deposit, and ulceration of the mucous follicles about the isthmus faucium. Dr. Horace Green, of New York, has described this affection, when far advanced, as consisting of a diseased con-

dition of the glandular follicles of the mucous membrane of the throat and windpipe, commencing usually in the mucous follicles of the isthmus of the fauces and of the upper portion of the pharyngeal membrane, and extending by continuity until the glandulæ of the epiglottis, larynx, and trachea are extensively involved in the morbid action. He calls it *follicular disease of the pharyngo-laryngeal membrane.*

Symptoms.—These principally consist of an uneasy sensation in the upper part of the throat, with continued inclination to swallow; as if there were some obstacle in the œsophagus which could be removed by deglutition. The patient also makes frequent attempts to clear the throat of phlegm by coughing, hawking, and spitting: he will point to the larynx, too, as being the seat of pain. At the same time the voice undergoes an alteration; there being loss of power, and hoarseness, sometimes complete aphonia, especially towards the evening. On examining the throat and fauces, we shall find these parts presenting an unhealthy, slightly raw, or granular appearance; the mucous follicles may be visible, sometimes filled with a yellowish substance; and a viscid muco-purulent secretion will be seen adhering to the palate, as well as to the edge of the velum pendulum palati.

This sore throat either exists alone, or it may accompany or follow laryngitis, bronchitis, or phthisis. Clergymen, barristers, public speakers, actors, singers, &c., are most liable to it.

Treatment.—In its early stages, when merely a nervous affection, the treatment is resolved into the use of tonics, especially iron and quinine; cold plunge or shower baths, or sea bathing; together with temporary change of scene and occupation. Where the disease is further advanced, a combination of internal with local remedies will be necessary. Iodide of potassium (F. 31), iodide of iron (F. 32), iodide or bromide of ammonium (F. 37, 38), small doses of perchloride of mercury (F. 27), phosphate of zinc (F. 414), strychnia and steel (F. 408), steel and chlorate of potash (F. 402), quinine with iron and arsenic (F. 381), phosphoric acid with nux vomica and bark (F. 376), and cod-liver oil (F. 389), will prove the most efficacious remedies.

The local treatment consists in the application of a solution of nitrate of silver (from forty to sixty grains of the crystals to the ounce of distilled water) to the diseased parts, and even to the interior of the larynx. This is effected by means of an angular brush, or of a whalebone probang about ten inches long, having a piece of fine sponge, the size of a pistol-bullet, attached to its extremity. The difficulty of introducing the sponge or probang between the lips of the glottis is greatly lessened by employing the laryngeal mirror; with which the instrument can be seen to enter the larynx. One of the methods of using the sponge is described somewhat thus by Dr. Hughes Bennett: The patient being seated in a chair and exposed to a good light, the practitioner stands on the right side and depresses the tongue with a spatula held in the left hand. Holding the probang with the sponge saturated with the solution in the right hand, this instrument ought to be passed carefully over the upper surface of the spatula exactly in the median plane, until it is above or immediately behind the epiglottis. The patient should now be told to inspire; and as he does so, the tongue must be dragged slightly forwards with the spatula, and the probang thrust downwards and forwards by a movement which causes the right arm to be elevated, and the hand to be brought almost in contact with the patient's face. The operation of course requires dexterity, since the rima glottidis is narrow, and unless the sponge comes fairly down upon it, the aperture is readily missed. The passage of the sponge into the proper channel may be determined by the sensation of overcoming a constriction, which is ex-

perienced when it is momentarily embraced by the rima, as well as by the spasm and harsh expiration that it occasions.* When recourse is had to the laryngoscope, the patient draws his tongue forwards and holds it tightly. Then, the operator taking the mirror fixed in its handle with his left hand, introduces the sponge with his right, and guides it by the aid of the reflected image (see p. 431). The application, however made, will be required about every other day for two or three weeks.

If it be thought preferable, as it usually must be, to disperse a minutely divided and misty shower of some medicated solution over the diseased surfaces, recourse may be had to one of the many excellent instruments now in use for the inhalation of medicated fluids reduced to the form of spray. This practice first attracted attention in 1858, when Sales-Giron constructed his "Pulvérisateur portatif des liquides médicamenteux." Some years previously, however, Mr. Tompson had published an account of his very ingenious "Hydropneumatic inhaler," an instrument consisting of a bellows worked by the foot, a glass cylinder or flask traversed by sixteen capillary tubes, an adjusting apparatus, and a nozzle furnished with a screw-cap for the inclosure of a plate of fine silver-wire gauze. The fault of this apparatus is its clumsiness. Hence, it must be superseded by such as Bergson's hand-ball spray-producer, which has the merit of simplicity and cheapness, and from which the tubes sold by perfumers for pulverizing scents have been adopted. Siegle's atomizer, as modified by Krohne and Sesemann, in which the fluid is forced forwards by steam instead of wind, is a most serviceable instrument. The "traveller's atomizer," made according to the suggestions of Dr. Beigel, can also be strongly recommended. The drug to be chosen will depend on the symptoms, but generally an astringent (F. 262) is needed. Gibb's laryngeal injector, or hand-atomizer, can be employed when it is desirable to apply a shower of spray to the larynx alone, without allowing it to be inhaled. This instrument consists of a ribbed india-rubber ball, a curved silver tube having a small circular disk near its terminal end, and screwed to this disk a capsular bulb of platinum, with very minute perforations. This injector answers admirably for applying one or two drops of a solution of nitrate of silver to the interior of the larynx.

To prevent a recurrence of follicular disease the throat should be properly covered, no protection being more efficient than that with which man is naturally provided. Hence, the beard ought to be allowed to grow. Moreover, every working man requires one day's rest in seven. The conscientious clergyman, whose duties are as toilsome as those of the mechanic or day-laborer, should make a rule of taking a thorough holiday on every Monday. In obstinate cases, a winter at the Undercliff (F. 434), or at Torquay (F. 436), at Pau (F. 443), at Malaga (F. 445), or at Algiers (F. 451), may be strongly recommended.

When the tonsils remain enlarged and indurated (as they often do after this form of sore throat, as well as after repeated attacks of tonsillitis) various astringent gargles and inhalations, preparations of iodine, and the solid nitrate of silver have been long employed. A piece of pyrethrum

* The mistake of trusting to these sensations is well illustrated in the Report of the Commission of the New York Academy of Medicine, appointed to inquire into this subject: "We witnessed in Cases 11 and 21 the fallacy of Dr. Horace Green's opinion as to the success of his experiment, though based on so large an experience. In both instances whilst positive that he had successfully passed the instrument (an elastic tube) into the trachea, *the patient vomited through the tube*, and thus demonstrated his error." This of course happened before the laryngoscope had come into vogue.

(Pellitory of Spain) chewed slowly, is occasionally useful in relieving relaxation of the tonsils. Nevertheless, not unfrequently permanent and effectual relief will only be obtained by the excision of one or both of these glands. Mr. Harvey has condemned this practice, and has stated that removal of the tonsils interferes with the development of the genital organs. I have seen, however, so much benefit from the operation, without any bad results, that I cannot but doubt the correctness of Mr. Harvey's views.

V. CROUP.

Croup (*trachealia, tracheitis*, or *cynanche* trachealis*) will be best defined as an acute inflammatory disease of the trachea, or often of the glottis, and larynx, and trachea; the fever and inflammation being accompanied by the exudation of false membranes upon the affected mucous surfaces.

Croup is a disease of early life, most cases of it occurring during the second year of childhood. Some families seem more predisposed to it than others. Male children are rather more obnoxious to it than female; while when an attack has been gone through, there is a liability to a recurrence of the disease at any time up to puberty. The inflammation is often complicated with bronchitis or pneumonia. It may end fatally from exhaustion, suffocation, convulsions, or the formation of a clot in the heart.

Symptoms.—In the incipient stage the symptoms are those of a common cold—such as slight fever, cough, hoarseness, drowsiness, suffusion of the eyes, and running at the nose. There is usually more or less fretfulness. In some few instances, the child clutches or rubs its larynx, as if there were an uneasy sensation there; or there may be a slight hesitation in swallowing, as in simple sore throat. If we examine the fauces, however, no trace of disease will be detected; and if we resort to auscultation or percussion, the chest will be found healthy.

At the end of twenty-four or thirty-six hours, the second or developed stage sets in. The child is suddenly awoke, almost invariably during the night, by a sensation of suffocation; together with a peculiar acute and dry, and ringing brassy cough, and hurried breathing. He is agitated and alarmed, and wants to sit up or leave his bed; his face becomes slightly swelled and flushed; and his eyes are suffused and bloodshot. Each inspiration now becomes prolonged; while it is attended with a characteristic crowing noise, readily recognized when once it has been heard. These distinctive coughs, and the difficult and crowing inspirations, probably continue to recur in paroxysms, through the remainder of the night; while the little sufferer continually changes his position, in the vain attempt to find that relief which is denied to him. As the morning dawns, however, there is a slight remission of the symptoms, and a short slumber will probably be obtained. But the improvement is transitory: the disease advances, the fever increases, the voice becomes more hoarse, the paroxysms of cough get more frequent, and the breathing is more difficult and hurried. There is also great thirst, the tongue is coated with a thick fur, the pulse gets quicker and harder, and the child becomes very irritable and restless. It is now very commonly noticed that the hand seizes the larynx, as if to

* From κύων = a dog + ἄγχω = to strangle; because dogs were supposed to be especially liable to sore throat.

remove some obstruction; or the fingers are thrust into the mouth, as if to drag away the cause of suffering. Then the arms are thrown wildly about, and all covering tossed aside; the countenance becomes flushed, and at times almost livid; while as each paroxysm of cough comes on, and as the dyspnœa becomes urgent, the head is thrown back as far as possible, in order to increase the capacity of the windpipe. Through the whole progress of the disease, exacerbations are observed to take place at night, with remissions in the morning. The cough is unattended by expectoration, and each fit of coughing is usually followed by a paroxysm of dyspnœa. The act of speaking seems to increase the suffering, for the child only whispers, or often refuses to utter a word. The bowels are constipated. There is seldom any sickness. And although the appetite for food is quite lost, there is a constant desire for drink; notwithstanding that deglutition sometimes appears to cause pain.

As the disease advances towards the third stage, or that of collapse—or of threatened suffocation, the intermissions between the paroxysms grow shorter, so that there is scarcely any remission; the cough gets more difficult, less audible, suppressed, and strangulating; the voice is nearly or quite abolished; the croupal respiration is permanent; and every now and then suffocation seems imminent. Moreover there is drowsiness, which soon becomes extreme though the sleep is uneasy; for the child starts and wakes in terror, and grasps convulsively at any object near him. If no relief be given by the expectoration of the muco-purulent matter, or of the membranous exudation obstructing the larynx and trachea, very alarming effects follow. The skin becomes cold, and covered with clammy sweats; the pulse gets very frequent, feeble, and intermitting; the respiration grows more difficult, and accompanied with a hissing noise; the movements of the larynx are forcible and incessant; while the head is thrown back, the alæ nasi are rapidly dilated and contracted, the eyes are dull and sunken, and the complexion is livid. The countenance is also expressive of the greatest agony. At the end of about twelve or eighteen hours, the child dies with signs of convulsive suffocation, or it sinks exhausted into a state of coma, from which death ultimately relieves it.

The practice of auscultation, in the second and third stages, yields information as to the amount of air entering the lungs, and the extension or not of the inflammation to the bronchial tubes and lungs. When the obstruction to the entrance of the air is great, the inspiratory murmur may be quite imperceptible in the smaller bronchi, except during an unusually deep inspiration, after a fit of coughing: at the same time there is healthy resonance on percussion. According to Barth and Roger,* a kind of vibrating murmur or *tremblotement* can be heard over the larynx or trachea, when the false membrane has become partially detached and is floating; but this murmur is in reality seldom to be detected. Should bronchitis supervene, we shall find the sonorous rhonchus indicative of it masked, in some degree, by the croupy noise in the trachea; and such will likewise be the case with regard to the small crepitation of pneumonia. But in the latter case, there will be impaired resonance on percussion over the inflamed portions of lung.

The *duration* of the disease varies according to the violence of the inflammation and the strength of the patient: the average time is from two to six days, a fatal issue being most common on the fourth day. Occasionally, however, the morbid action runs a very rapid course. Thus, Professor Gölis, of Vienna, relates the case of a healthy little boy, aged four years;

* Traité pratique d'Auscultation. Second edition, p. 261. Paris, 1844.

who, going into the open air on an extremely cold day, was attacked with croup, which proved fatal in fourteen hours.*

Morbid Anatomy.—The mucous membrane of the larynx and trachea and bronchial tubes is generally found inflamed, red or livid, congested, and swollen. Sometimes there are abrasions or ulcerations; while very frequently there is a layer of viscid muco-purulent matter, or more commonly an exudation of false membrane. This membrane is found more frequently in the larynx than in the trachea, and in both structures more often than in the bronchial tubes. On the Continent frequently, although very rarely in this country, the exudation is also found on the velum palati, and about the fauces and pharynx. It generally presents the appearance of a thin but rather firm layer; it is unorganized, and consists of either coagulated albumen or of fibrin, but most probably of the former. Signs of pneumonia are not unusual. Care must be taken not to confound the symptoms and appearances due to pulmonic congestion arising from the suffocative influence of croup with those which result from inflammatory action.

Pathology.—From the foregoing it seems evident that this disease consists of inflammation of the mucous membrane, exciting spasmodic action in the larynx and trachea, and giving rise to a peculiar product,—a pseudo-membranous secretion. The result is imperfect aeration of the blood; for the access of air to the minute vessels is impeded by the spasm, as well as by the extension and accumulation of the croupal productions.

The question as to whether the inflammation is of a simple kind, or dependent upon the presence of some specific poison in the system, as is the case with the eruptive fevers, &c., has been entertained but not satisfactorily answered. My own views are certainly in favor of the latter opinion, and for these reasons: The second attacks of croup are (as a rule) much less severe than the first, because the susceptibility of the system to the action of the poison is partly exhausted, just as is seen in the practice of syphilization: the occasional prevalence of the disease in an epidemic form seems to indicate a particular agent as its cause: when laryngitis is excited in children by some poisonous irritant, or by drinking boiling water from the spout of a tea-kettle, the results are very different; and false membranes are not exuded, even though the inflammation extend to the trachea. Cases of croup though rare in the adult sometimes occur; but the symptoms are different from those of simple laryngiti-, and they do not as often yield to the same treatment—*i. e.*, to making an artificial opening into the wind-pipe—which sometimes cures the latter. Again, if laryngitis be artificially produced in the lower animals, false membranes are not exuded; though croup (identical in its phenomena and organic changes with the disease in the human subject) does spontaneously occur in them, as is seen in lambs, calves, puppies, cats, and in chickens—constituting the "pip." The latter especially often prevails epidemically in a farmyard, and produces a large mortality.

Complications of Croup.—One of the most dangerous complications is with cynanche maligna, as is sometimes seen when croup occurs during the course of scarlatina anginosa. The exudation thrown out from the inflamed surface forms a pellicle which covers the fauces and extends down the pharynx as well as down the air-passages; occasionally the pellicular exudation is only produced in patches, giving rise to an appearance of thin sloughs. Some authorities have thought that croupal inflammation might originate in ton-

* Tractatus de rite cognoscendâ et sanandâ Anginâ membranaceâ. Obs. iv, p. 141. Viennæ, 1813.

tillitis, the disease extending over the fauces, as well as down the pharynx and larynx; but I have seen nothing which would lead me to coincide with this view. Occasionally croup is complicated with aphthous ulcerations about the mouth and palate: this is seen when the disease occurs in feeble subjects, who have been previously suffering from disordered states of the alimentary canal. Where croup supervenes upon measles or small-pox or erysipelas, the inflammatory fever assumes a low type, convulsions are frequent, the difficulty of respiration is excessive, and the paroxysms of suffocation are extreme. Lastly, the croupal inflammation of the larynx and trachea, may extend to the bronchial tubes, and thence to the substance of the lungs—pneumonia; a complication which in almost all cases terminates fatally.

Diagnosis.—The manner of the onset, the hoarseness or loss of voice, the dry ringing cough, the early severity of the symptoms, the exacerbations and remissions, the croupal inspirations, the inflammatory fever, the heaving of the thorax, and the motions of the larynx and trachea, distinguish this disease from every other. It can indeed only be confounded with true laryngitis. But this latter affection occurs in adults, very rarely in children, except as associated with croup; laryngitis causes a fixed burning pain in the larynx increased by any examination; it does not give rise to the exudation of false membranes; and when prolonged it ends in suppuration, or ulceration. The diagnosis between croup and spasm of the glottis is very simple: for in the latter there is an absence of fever and of the peculiar cough, the intermissions between the fits of suffocation are complete, and there are general convulsions with spasmodic contractions of the toes and thumbs during the seizure.

Prognosis.—Croup may terminate in (1.) Recovery. This result can be expected in mild forms, when the respiration is comparatively quiet during the intervals between the paroxysms of cough; when the cough is loose, and followed by the expectoration of muco-purulent matter, or of fragments of the membranous exudation; when there is a gentle perspiration over the skin; when the disease is uncomplicated; and when it is not attended with great prostration of the vital powers. (2.) The disease may pass into some other malady, or excite additional disease, thus materially increasing the danger. In addition to the obstruction of the respiration produced by the exudation of croup, this affection tends to give rise to spasmodic closure of the glottis; the fits of suffocation which result always leading to great pulmonary congestion, as well as to a marked disposition to consecutive disturbance. The extension of the inflammation to the bronchi and to the substance of the lungs is a very unfavorable event; producing lividity of the face, great drowsiness, cold clammy sweats, great frequency of pulse, and suffocating paroxysms of cough with very short intermissions. What is called laryngeal or tracheal consumption will perhaps result from croup; a condition characterized by pain in the larynx, suffocating cough, spasmodic attacks of dyspnœa, muco-purulent expectoration, and hectic fever, coming on after the subsidence of the acute symptoms, and perhaps just as a successful termination is about to be prognosticated. Or, the active signs of croup may be subsiding, and suddenly a relapse takes place, owing to the aggravation of the slight inflammatory action which remained unsubdued. This tendency to a relapse must make our prognosis guarded for the two or three weeks during which it exists, in all instances; but particularly in weakly and irritable children. Lastly, congestion of the brain, giving rise to the effusion of serum into the ventricles, convulsions, &c., may be an indirect consequence of croup. Dr. Copland and others have met with instances of hydrocephalus following the disease, but they are not common. (3.) In the greater number of cases it is to be feared, this

disease ends fatally. Much danger is to be apprehended where the symptoms progress to the third stage; where the fever, from the first, is intense; where the attacks of dyspnœa are very severe; where the cough is not followed by expectoration; where the pulse is very frequent, small and irregular; and where the countenance becomes livid, the eyes sunken, the features contracted, the tongue dark, and the lips covered with sordes,—all symptoms indicative of great exhaustion.

The mortality from croup is very great, for probably rather more than half of the children attacked die. If we take twelve cases of death from various diseases during childhood, we shall find that about one is owing to croup. The fatal cases of this disease in England, during 1866, amounted to $\frac{\text{Males } 2706}{\text{Females } 2462} = 5168$, of which number 4533 were under five years of age. In a large number of the unfavorable cases death seems to take place from asphyxia, while in some instances it certainly appears due to a deposit of fibrin in the heart. After death from acute croup, Dr. Richardson has more than once found the cavity of the right auricle filled with a fibrinous concretion, which must have been formed during life, as the masses of fibrin were grooved by the currents of blood passing over them from the inferior and superior venæ cavæ. With such cases death begins at the heart, the dyspnœa being caused by the want of blood in the pulmonic capillaries. The lips are slightly blue, the body is pale, and the pulse irregular, while the heart-beats are feeble and quick and irregular. The sounds are muffled, and sometimes there will be a bruit. The respiratory murmur is everywhere audible, and frequently there are signs of emphysema.

When in croup death is going to happen from suffocation, auscultation and percussion give evidence of the existence of congestion of the lungs, but never of emphysema; while the body becomes of a dark hue, there are convulsive muscular movements, the heart-sounds are clear, and the pulse gets very feeble.

Causes.—Croup is more frequent in cold, damp, changeable climates than in warm regions: hence it is common in the northwest countries of Europe, but almost unknown in the south. It is also most prevalent in low moist localities, during the winter and in the early spring months, and especially perhaps after the long continuance of heavy rains with east or northeast winds.

Children of a nervous and sanguine temperament seem more disposed to the disease than others. When it occurs during the first twelve months of life it is seen most frequently in weakly infants brought up by hand, and boys are more liable to it than girls, perhaps (though this is very doubtful) because they are more exposed to its exciting causes. Some authors imagine that an hereditary tendency to croup often exists; others, that the disease is infectious; the only support, however, to these opinions is derived from the circumstance that two or more children in the same family are often seized with it, forgetting that they have been placed under the same circumstances as regards the exciting causes. There is but little doubt, that though croup usually occurs as a sporadic disease, yet it sometimes prevails as an epidemic, and perhaps it did so more in former times than in the present day.

As regards the immediate or exciting causes of croup (the foregoing must be regarded more as predisposing causes) very little is positively known. Still, it is probable that habitual exposure of the neck and throat to cold, insufficient clothing, and such circumstances as induce common catarrh and bronchitis in the adult, will under certain conditions give rise to it.

Treatment.—In no disease, perhaps, is it more necessary to be prompt and cautious and unwearying in our attendance. Even where an attack of

oup is merely apprehended in a child having a catarrh and slight rough ringing cough, we should carefully watch the patient, place it in a warm th for some ten minutes, confine it to bed, keep the air of the apartment ist by the evaporation of boiling water, allow only a milk diet, and der frequently repeated draughts of a saline mixture containing small ses of ipecacuanha wine with spirit of nitrous ether.

When the inflammatory action is established, there are three remedies on hich all authorities teach us to rely—viz., bloodletting, tartarated anti-ony, and mercury. Perhaps there is no infantile disorder which is so rely and eagerly recognized by practitioners, and so zealously and per-veringly treated on this plan as croup; for mistakes in diagnosis are very re, and errors in treatment are seldom committed—supposing that the thorities are correct. The question may well be asked then, How is it at the disease is so fatal? I believe, from my own experience, because e chief remedies are not only inappropriate but mischievous. Every phy-cian knows that when he is summoned to a consultation on a case of croup is sure to find that the sufferer has been either leeched or blistered, and probably is informed that *in spite* of the loss of blood the inflammation s increased. It never strikes the practitioner that he should say "in con-quence of;" yet it would be probably nearer the truth. I would strongly ge, then, that this plan of indiscriminate bleeding be discontinued, and the same time would recommend that even antimony and mercury be lministered very cautiously, if at all. Blisters never have any other than injurious effect.

But if we are not to bleed or blister in a severe case of croup, what are to do? Well, in the first place, the little patient is to be confined to d, and to be clothed in flannel. The air of the room is to be kept warm d moist. If our visit be paid at the onset of the disease, the inflamma-ry action can sometimes be arrested by hot fomentations alone—as recom-ended by Dr. Lehmann and successfully practiced by Dr. Graves. A onge, the size of a large fist, dipped in water as hot as the hand can bear, ust be gently squeezed half dry, and instantly applied beneath the little fferer's chin so as to cover the larynx, the temperature being maintained re-soaking it every two or three minutes. A steady perseverance in this an for twenty or thirty minutes, produces vivid redness of the skin over e whole surface of the throat; while under the influence of this soothing, pical treatment, a gentle perspiration breaks out—to be encouraged by arm diluents. A notable diminution also takes place in the cough, hoarse-ss, huskiness of voice, dyspnœa, restlessness, &c., while frequently a sound eep is enjoyed, from which the patient awakes nearly well. Supposing at this amelioration does not take place, very little time has been lost, d we must resort to emetics—a most valuable class of remedies. The ipe-acuanha wine (in doses varying from one fluid drachm to two drachms, ac-rding to the age) should be given every fifteen minutes until free vomiting as been induced; while, unless the breathing is relieved, a dose sufficient keep up the nausea may be repeated every three or four hours until de-ided ease is afforded. When this is obtained, great benefit will result from e administration every two hours of a draught containing one or two rains of iodide of potassium, some aromatic spirit of ammonia, a little nega, and any aromatic water. Some broth or beef tea ought to be given peatedly, together with sweetened tea containing half milk, cocoa, or ocolate made with milk, and melted calf's-foot jelly, or any agreeable de-ulcent drink. At the same time that this plan is pursued, the tempera-re of the body is to be taken by a thermometer placed under the armpit, with care, under the tongue; and if (as it usually is in the first and

second stages) the degree of heat be above the normal standard, a warm bath ought to be administered, and the patient immersed in it up to the chin for fifteen or thirty minutes, according to the effect produced. It is of course clear, that a patient having a temperature of 104° or 105° Fahr., must part rapidly with some of this heat if placed in water warmed only to 98° or 100°, unless, as fast as the heat is given off it be regenerated. This bath is not only cooling, but sedative; it may be repeated twice or thrice in the twenty-four hours, but only under the personal superintendence of the practitioner. To avoid alarming the child, the bath ought not to be prepared in its presence; and when brought into the sick-room the top of it should be covered with a blanket, on which the patient can then be placed and slowly lowered into the water. A piece of wood or some toy may be floated on the surface to engage the attention of the little sufferer.

In order to prevent the formation of false membranes, some physicians assert that mercurial inunction should be had recourse to from the commencement of the severe symptoms; thirty, or even sixty grains, of the unguentum hydrargyri being gently rubbed in every four or six hours. The practitioner must use his own judgment as to the employment of this agent. No harm can arise from calomel given at the onset as a purgative, in doses of two, three, or four grains; but I have no faith whatever in the power of mercury to control croupal inflammation, and believe that its frequent administration is very injurious. During the latter stages of the disease it will be necessary to support the powers of life by the exhibition of the yolk of a raw egg beaten up in tea, and good broth or beef tea, while wine, or a few drops of aromatic spirits of ammonia, or brandy with milk or water, should be frequently repeated. A mixture of ammonia and ether (F. 364) often gives temporary strength, and acts as a restraint upon the formation of blood-clots. The inhalation of oxygen, from a gasometer charged with equal parts of common air and oxygen gas, has been recommended when asphyxia threatens; and certainly this remedy appears deserving of a trial, though no opportunity of testing its value has fallen in my way. I have, however, administered the peroxide of hydrogen (F. 370); but the effect has only been of a negative character—it seemed to be neither beneficial nor injurious.

According to M. Küchenmeister, of Dresden, diphtheritic membranes are rapidly dissolved in lime-water. Pieces of these membranes put into lime-water break up in from ten to fifteen minutes. M. Biermer, Professor of Clinical Medicine in the University of Berne, confirms this statement. In a bad case of croup this latter gentleman effected a cure by the use of hot pulverized (atomized?) lime-water. The inhalations softened and detached the exudations. M. Küchenmeister also successfully treated a case of diphtheritic pharyngo-laryngitis by lime-water inhalations; and Dr. Brauser cured one of croup in the same way. There are also other drugs (F. 262), and even plain warm water, which may be fairly tried in the form of spray.

Can we do any good by tracheotomy? This is a question the consideration of which must force itself upon every practitioner treating either a case of croup, or one of diphtheria, or one of laryngitis, &c. Looking at the pathology of the disease now under consideration, remembering that the inflammation frequently extends into the bronchial tubes, that the serious dyspnœa for the most part arises from the albuminous exudation obstructing the trachea and bronchi, and that tracheotomy when performed in croup has a tendency to induce bronchitis or pneumonia,—remembering these points, there appears to be much less chance of a favorable issue than may be expected from the same proceeding in laryngitis

Moreover, if the sufferer appears to be dying from syncope (from some obstruction about the heart) then tracheotomy will be useless; for there has probably been a deposition of fibrin in the right auricle or ventricle, and we can only trust to the administration of ammonia with other restoratives. Yet granting all this, it must still be remembered that making an opening into the trachea is sometimes the only proceeding which can be of any avail to prevent immediate asphyxia; while not only does it directly prolong life by the admission of air, but it affords time for the disease to run through its several stages with more or less hope of its terminating favorably. The strong advocate for this surgical proceeding was M. Trousseau, who, during four years, operated twenty-four times in private practice with fourteen cures, and two hundred and sixteen times at the Hôpital des Enfans Malades with only forty-seven recoveries. Many of the latter patients, however, were in a miserable condition before being seen. My former colleague, Dr. Conway Evans, says: "The operation of tracheotomy for the relief of croup has been many times performed in this country, and in at least *ten* cases with the most signal success, life having been saved when the patient had been literally almost at the last gasp."* Mr. Henry Smith is also a strong advocate for this operation, and he tells me that when it fails to save life it still affords great temporary relief. The truth of this observation will be apparent to every practitioner who may have had the opportunity of comparing the very painful death which results from gradual suffocation, with the easy sinking of fatal exhaustion.

To bring these remarks to a practical issue I would therefore say, that if the predominant symptoms are those of asphyxia—if the air does not freely enter the lungs at each inspiration, tracheotomy is the remedy; this proceeding being resorted to as soon as the false membranes appear to be causing obstruction, instead of deferring it as a last resource. The operation should be performed slowly and cautiously and deliberately, so as especially to avoid wounding large vessels; either pure chloroform or chloroform and ether (F. 313) ought decidedly to be used, unless the child's consciousness have been already destroyed by the circulation of non-oxygenated blood; the external incision is to be large enough for the operator to see what he is about; the double bivalve canula must be employed, taking care not to have it too small; and before thrusting the scalpel into the trachea, this tube should be fixed and drawn forwards by means of a sharp hook inserted into it. As soon as the rings of the trachea are divided the child coughs violently, mucus and shreds of false membrane are expelled through the opening, and the air rushes out with a characteristic shrill and hissing noise. If any pieces of false membrane bulge out of the wound, they should be gently withdrawn. The outside shield, or tube, is to be introduced, taking care that it really does enter the trachea; and then the inner tube is easily passed through this valvular canula. With adults it may possibly be best to open the larynx by dividing the crico-thyroid membrane; but in children the larynx is too small to admit the tube, and therefore tracheotomy will have to be performed through the upper rings of the trachea. Dr. Marshall Hall suggested that when the operation has to be performed before instruments can be procured, it may be done with a simple pair of pointed scissors. The integument, being taken up horizontally by the thumb and finger of the left hand, is to be divided longitudinally by the scissors; these should then be promptly forced into the trachea, to the proper depth, and opened horizontally to the just extent; the scissors must be then turned, being kept in their place,

* Edinburgh Medical Journal, vol. v, p. 416. November, 1859.

and opened in the direction longitudinally. The operator has thus made, in little more than a moment of time, an opening through which the patient may breathe until further appliances can be obtained. Life or death depends meanwhile upon keeping a steady hold of the instrument. But most decidedly such a rough proceeding as this, full of danger, can only be justified by the peril of immediate death from suffocation. In whatever way the operation may be performed, when completed the most urgent thing to attend to is the feeding of the child; for, under the influence of abstinence, the absorption of external miasmata as well as of the vicious secretions fabricated within the body is favored, and the power of resistance is enfeebled. Milk, eggs, chocolate, and broths, form the most suitable diet. Then also, I am convinced that medicines had better be abandoned; the air of the apartment is to be kept warm and moist; and the patient's neck should be lightly enveloped in a large piece of muslin, or in a very thin fomentation flannel.

Every now and then it happens after the operation that there is a difficulty with deglutition; fluids especially passing through the glottis, and penetrating down the trachea to the bronchi. The irritating effect thus set up makes it most difficult to persuade the child to take nourishment. The best means of remedying this is to avoid liquid diet, giving solid or semi-solid substances; at the same time allaying thirst by a little cold water just before or long after the repast, so as to avoid exciting vomiting. The inconvenience usually commences three or four days after the operation, and rarely continues longer than from the tenth to the twelfth day. It might be thought that the larynx, which thus permits liquid aliments to pass, would allow the passage of the air also; but it is not so, for if we remove the canula, the natural passage will be found insufficient. M. Archambault, who has paid much attention to this complication, believes that it results from the child having by the use of the tracheal tube lost the habit of moving the muscles which close the larynx, in harmony with those which propel the food; and he has found it advantageous to temporarily close the tube with the finger during the attempt at deglutition, the child then being obliged to bring the laryngeal muscles into action, and the harmony becoming re-established. This stratagem, however, often fails.

Finally, the removal of the canula and the definitive closure of the wound require attention. This instrument can seldom be dispensed with before the sixth day, and sometimes not till the twelfth or fourteenth; but usually about the end of the first week we shall be justified in taking it out with great care, provided that for a day or two previously the child has been able to breathe for a time with the tube obstructed by the finger or any easily-fitting plug. The young patient, however, having become accustomed to breathe by the artificial aperture may be seized with a paroxysm of fear and difficult respiration on the first removal. There will possibly be some obstruction of the larynx, by slightly adherent false membranes, mucus, or tumefaction; and the laryngeal muscles may have somewhat lost the power of harmoniously contracting. Yet the difficulty of breathing usually soon disappears if the child can be kept quiet; and, according to the degree in which the laryngeal passage seems re-established, the wound can be strapped with court plaster, or left for a day longer covered with ointment or lint. Supposing the air does not pass easily through the chink of the glottis, the canula and tube ought to be replaced and retained until they can be removed without any dyspnœa occurring. When healthy respiration is re-established, the opening in the trachea usually becomes closed in four or five days, and the external wound heals soon after.

VI. DIPHTHERIA.

Diphtheria (*Διφθέρα*, a skin or membrane) may be described as an epidemic sore throat of great severity, due to toxæmia; being attended with much prostration, and characterized by the exudation of false membranes on the tonsils and adjacent parts. When it does not end fatally, it is often temporarily followed by an alteration in the voice, partial paralysis of the muscles of deglutition, weakness of the upper extremities, anæmia, and impaired vision.

From the writings of old physicians it appears certain that this disease prevailed extensively at different times in the sixteenth, seventeenth, and eighteenth centuries. In France an epidemic broke out in 1818, which was described by Bretonneau, under the name of Diphthérite, in Mémoires communicated to the Académie Royale de Médecine in 1821. About the same time also, some sporadic cases seem to have occurred in Scotland, and a few in England. English physicians, however, paid only slight attention to the subject until the outbreak of the epidemic at Boulogne, in January, 1855. In this country the first cases of the last epidemic were observed in the middle of the year 1856; and it has continued more or less prevalent in different parts of England up to the present time.

Prior to an outbreak of diphtheria in any locality, throat affections have often been noticed to be unusually prevalent.

Pathology.—Diphtheria is a specific blood disease, which runs a rapid course. Its anatomical character is a spreading inflammation of the fauces and œsophagus and respiratory tract, with the exudation of lymph. In some instances (nasal diphtheria) the mucous membrane of the nasal fossæ is alone affected; recovery or death occurring before the morbid action has extended through the posterior nares to the pharynx. The lymphatic glands of the neck often become swollen and tender, especially in strumous subjects.

Where the cases recover, some remarkable nervous affections are apt to supervene; consisting of impaired or perverted sensibility, with progressive paralysis of the muscles of the tongue, fauces, pharynx, neck, trunk, or one of the extremities. These secondary nerve affections occur after mild as well as after severe attacks; while generally a few days of convalescence intervene between the two series of phenomena. During the year 1860 there occurred 210 cases of diphtheria at the Paris Hôpital des Enfans, and paralytic symptoms followed in 31 of them. The proportion was most likely greater; inasmuch as several of the children were removed from the hospital prior to the time at which consecutive paralysis is usually developed, while others died before this period arrived. M. Roger believes that the ratio generally may be considered as one in three or four. These secondary paralyses are as rare in the other acute diseases of children as they are common in diphtheria. Thus, in the same year and place, among 61 cases of angina simplex, 12 of typhoid fever, 33 of rubeola, 12 of scarlatina, 4 of variola, and 24 of pneumonia, not an instance of secondary paralysis occurred; and the like negative results were observed in M. Blache's wards.

Diphtheria and scarlatina sometimes occur as epidemics in the same district, while occasionally they coexist in one individual. Hence some have thought that diphtheria was only scarlatina without any eruption; and they have pointed to the facts that in modified scarlet fever there is now and then an exudation slightly resembling the diphtheritic membrane, while albuminuria sometimes is present in both diseases. Further investi-

gation shows, however, that these affections are distinct from each other, although there may be some analogy between them. Thus, an attack of the exanthematous fever, while it confers immunity to a second assault, does not afford any protection against diphtheria. A person may suffer from the latter disease more than once, the last seizure being as violent as the first; relapses are not very uncommon; and the larynx is often affected, though it is never involved in scarlet fever. Furthermore, albuminuria occurs only during convalescence from scarlet fever; while when it takes place in the epidemic sore throat, it may be found on the first or second day of the disease. And then, lastly, there is a marked difference between the sequelæ of the two affections.

Diphtheritic affections now and then appear sporadically, they often seem to be endemic, while they are also epidemic and contagious (not infectious). Bretonneau asserts, from the consideration of innumerable facts, that those who attend patients with diphtheria cannot contract it, unless the diphtheritic secretion, in the liquid or pulverulent state, is placed in contact with a mucous membrane, or with a part of the skin denuded of epidermis. Diphtheria attacks both sexes, at all ages, though children seem to be especially obnoxious to it; it is probably most fatal to the poor, or such as reside in damp situations and in badly drained houses; while spring and autumn appear to be the seasons when its ravages are greatest.

Symptoms.—Diphtheria sets in very gradually, with feelings of depression and muscular debility, headache, nausea, slight diarrhœa, chilliness, and drowsiness. Many hours before the throat is actually sore, a sense of stiffness in the neck is complained of. Then the tonsils become rather dark-colored and swollen, and the glands about the angles of the lower jaw get tender; while as the low inflammatory action proceeds, it involves the velum, uvula, posterior part of the pharynx, &c., and perhaps causes painful or difficult deglutition. With regard to the small word "perhaps" just employed, it is meant that the amount of pain in the throat affords no criterion as to the extent of the constitutional disease; for in not a few instances there is less general discomfort and local suffering than in simple acute tonsillitis, while in many of the fatal cases there has been little more than a feeling of uneasiness.

It is probable that at this stage resolution of the inflammation may in some instances take place, and the patient be soon restored to health. More commonly, however, the characteristic feature of the disease now becomes manifested, and a plastic fibrinous material is effused. This exudation commences in the nasal fossæ, or on the soft palate, or on one tonsil, or on the back of the pharynx, in the form of small ash-colored specks; these spots by their enlargement and coalescence forming patches of considerable size. As the disease spreads, the false membrane increases in thickness and in extent; it usually becomes firmly attached to the mucous tissue beneath; and if it be forcibly removed a new patch will be produced by the end of a few hours. But if the exudation be cast off naturally, then either no new false membrane is formed, or only one which is much more filmy than the first. The exudation has been compared to wet parchment, or to damp and dirty wash-leather. It may spread forwards to the cheek and gums, upwards into the nares, downwards into the œsophagus, and even through the glottis into the larynx and trachea; and when it begins to separate and decompose, the patient's breath is rendered most offensive. Probably, the browner or blacker the color of the pellicle, and the more dense its texture, the greater is the danger. As the lymphy deposit is cast off, we shall either have ulceration, sloughing, or gangrene of the mucous coat; or this tissue will gradually assume a healthy appearance. And

Lastly, true diphtheritic membranes may form on abraded cutaneous surfaces,* on the conjunctiva, on the vaginal mucous coat, or on the lining membrane of the rectum; giving rise to a general morbid state very likely to be misinterpreted, unless the possibility of this occurrence be remembered.

The general symptoms may be rather slight, especially at first. Perhaps there is only a sense of weariness or dejection. In other instances the prostration is extreme, and there is considerable restlessness. Pain may be almost wanting. There is only moderate pyrexia, though the skin may be dry and harsh; the pulse is neither sharp nor hard, but it increases in rapidity as the depression becomes greater; while the tongue is clean or only slightly furred, the tonsils are much swollen, the saliva perhaps dribbles from the mouth, the breath is fetid, and there is a disinclination to move even to take drink or food. Then there may be great dysphagia, or the throat will even be much affected without any difficulty in swallowing. There are frequently attacks of hemorrhage from the nose, fauces, or bronchi. Sometimes there is purpura, now and then an erythematous rash, once in a way typhoid-looking rose spots, and occasionally sudamina; while in many severe instances there is found, from an early stage, albuminuria with fibrinous casts of the tubes. Death may happen from hemorrhage, gangrene, slow exhaustion, or from asphyxia, when the larynx and trachea are affected; the mental powers generally retaining their full vigor till the last. There have been many instances where a fatal termination has taken place very suddenly; and as I believe, from the deposition of fibrin within the heart or in one of the large vessels, and not from syncope as has commonly been stated.

In cases of recovery the convalescence is often very slow. There may be anæmia for many weeks; the voice is left impaired, owing to paralysis of the soft palate; sometimes the power of deglutition is not thoroughly regained for several months, the difficulty of swallowing liquids especially remaining; while the muscles of the neck are not unfrequently paralyzed, so that the head cannot be properly supported, or the muscles of the arm may be powerless, or there may be paraplegia, or very rarely there is hemiplegia (see p. 375). Enfeebled action of the heart is often a source of anxiety. With the diminution of motor power, there is commonly lessened sensibility. Defective vision is occasionally complained of, owing probably to paralysis of the ciliary muscle, and consequent loss of adjusting power; a condition which is to be remedied by the use of a low convex glass. In addition, I have seen more than once intense neuralgia as a sequela of diphtheria.

* One of the worst cases of diphtheria which I have seen occurred in this way: Three or four members of a family at Peckham were affected with diphtheria towards the end of 1866. They were tenderly nursed by their mother, who remained free from the disease. But just as the patients were convalescent, this lady imagined that she was going to have an attack of bronchitis; and without speaking to the practitioner who was in daily attendance, thought she would cure herself. She therefore applied a large blister over the sternum,—such a blister as only an amateur physician knows how to make use of. In a few days the raw surface thus produced was found freely covered with an ash-colored diphtheritic membrane; and the disease spreading, the whole front of the chest, including both breasts, became attacked. When I saw her in consultation with Dr. Griffith and Mr Philps on the eighth day of the disease, she had also two diphtheritic ulcers on the soft palate, one being of the size of a shilling. Her extremities were cold; the pulse was extremely weak; and the stomach was very irritable, so that food and medicines had been retained with difficulty. Milk, cream, brandy, ice, and pills of quinine with reduced iron were ordered. But all proved useless. She died about 25 hours afterwards, *viz.*, on November 29th.

If the diphtheritic exudation be examined microscopically, it will be found to consist of molecular particles, epithelium, pus-cells, and blood-corpuscles. Fibrillæ are but very rarely seen. The oïdium albicans can occasionally be detected; but the occurrence of this fungus is only exceptional, and when the membrane has begun to undergo an acid putrefaction. So also the leptothrix buccalis may be discovered, but it is also often found in the buccal mucus of healthy persons.

Prognosis.—On several grounds this is a very grave disease. Death not unfrequently happens, even within thirty-six hours, from the intensity of the general disorder—the blood-poisoning; or at a later period, from the severity of its local effects, or from the occurrence of some complication. A patient will apparently be doing well at the end of five or six days from the onset, and the pulse will be moderately good, yet in a few hours the exudative inflammation may extend to the larynx and rapidly cause asphyxia. If this danger be escaped, there is the fear of thrombosis, of uræmia, or of fatal enervation. Pyæmia has also occurred from the absorption of sanious matter produced by the putrid sloughs. Generally speaking, the following symptoms are especially alarming: albuminuria, suppression of urine, epistaxis, a very frequent pulse, a very slow pulse, delirium, somnolence, and dyspnœa.

The duration of diphtheria may be stated as commonly from three to twelve or fourteen days. For the number of deaths registered as due to this disease in the seven years, 1860–66, see the table at page 232.

Treatment.—Every one who has witnessed much of diphtheria must feel that remedies of a supporting kind are those which alone give any promise of being useful. There is no specific for this disease; and all that we can reasonably hope to accomplish is to guide the patient safely through it. From the beginning, the sick-room must be kept clean and wholesome; sulphurous acid gas (F. 74), or carbolic acid, or some other disinfectant being employed, if needed. It will also be as well to see that the atmosphere of the house is not being tainted by effluvia from the drains and dust-bin, and such like fruitful sources of mischief.

With regard to *local treatment*, it must be recollected that external applications to the throat are injurious or useless; leeches and blisters being only powerful for mischief, while fomentations or poultices fail to give any relief. If the case be seen within a few hours of the commencement of the symptoms, relief may be afforded by allowing the inhalation of acid vapor (two or three ounces of vinegar to the pint of boiling water). Then as the peculiar pellicle begins to show itself, we shall perhaps do good by painting the fauces gently with the tincture of the perchloride of iron, or with turpentine and glycerin mixed in equal proportions; or we can employ a gargle of one or two drachms of the tincture of perchloride of iron with seven of sweetened water, or one of the permanganate of potash (from one to two fluid ounces of the officinal solution, or four to eight grains of the salt, to eight ounces of water). The atomized spray of the officinal sulphurous acid (F. 262) is in my estimation a very valuable remedy in these cases; while it is so grateful to the patient that I have known its use asked for every few hours. Dr. Greenhow has very properly remonstrated against the severe topical applications which have been resorted to: "I am sure much mischief has been produced by its indiscriminate use, especially by the frequent tearing away of the exudation by probangs, or similar contrivances for the application of nitrate of silver, or of strong caustic solutions. Observing that removal of the exudation, and the application of remedies to the subjacent surface, neither shortened the duration nor sensibly modified the progress of the complaint, but that the false membrane

rarely failed to be renewed in a few hours, I very soon discontinued this rough local medication to the tender and already enfeebled mucous membrane."*

As to the *general remedies*, I believe that when the patient is seen early it may be advantageous to give an emetic of ipecacuanha and ammonia (F. 233); following up its action by a free allowance of some alkaline drink (F. 356, 360). But if the patient be depressed, if there be a manifest tendency to hemorrhage, or if the urine contain any albumen, I at once order the tincture of the perchloride of iron, as was first recommended by Dr. Heslop of Birmingham; and very frequently it has seemed advantageous to combine it with quinine (F. 380). Where the formation of fibrinous clots (thrombosis) is feared, ammonia and bark (F. 371), with or without opium, ought to be prescribed in the place of the steel. Possibly the peroxide of hydrogen, or some other preparation of oxygen (F. 370), might have a beneficial influence. Dr. Wade, of Birmingham, strongly recommends iodide of potassium, believing that it eliminates the poison from the system; with which object he gives two, three, or four grains, with five or ten grains of chlorate of potash, every two or three hours. My own belief is, however, that chlorate of potash in bark, without iodide of potassium, is preferable. But whatever medicine be selected, only limited confidence is to be placed in its efficacy. Simultaneously, pure milk and strong beef tea are to be systematically given, port wine should be administered, and a raw egg with cream or brandy and water (F. 17) is to be ordered twice or thrice in the twenty-four hours. Sometimes iced champagne proves very grateful to the patient's feelings; frequently a good draught of bitter ale, or lemonade, or spring water, or not rarely a tumblerful of milk will be preferred; either of these drinks being beneficial if relished for. Considerable benefit usually arises from constantly sucking small pieces of ice; in the same way that pure water is valuable as a diluent, especially by greatly increasing the action of the kidneys. Moreover, the use of ice is valuable in allaying vomiting, when the stomach is irritable; its power in this respect being aided by the application of sinapisms to the epigastrium. Directly there is great depression, brandy in often-repeated doses must be trusted to; and in such instances I think it better not to give any other alcoholic stimulant.

Under all circumstances the patient is to be kept in bed, and especially in the recumbent position. It frequently seems advantageous to have him clothed in flannel. The air of the apartment should be warm (70° F.) and moist; the latter being effected by keeping a pot of boiling water on the fire, through the lid of which a long curved tube has been fixed so as to allow the free end to project a few inches above the mantelpiece.

Many physicians begin the treatment of every case with an aperient, but I have seen no advantage from this practice. Of course the bowels can be acted upon, if necessary; but I always prefer a mild cathartic like castor oil to an active dose of calomel and jalap. If the secretion of urine be scanty, large and hot linseed poultices, with an occasional sinapism, ought to be applied over the loins, changing them every two hours. Where the exudation is obstructing the larynx, a stimulating emetic will possibly cause its expulsion; but this failing, tracheotomy may be demanded to prevent suffocation and save life. A most unequivocal example of the value of this operation is related by Sir William Jenner. He says: "There is not a shadow of a doubt on my mind that he (Dr. C.) would have been dead in two minutes, had his larynx not been opened at the

* On Diphtheria. By Edward H. Greenhow, M.D., &c., p. 263. London, 1860.

moment it was by Mr. Quain. I never saw any one so manifestly brought back from the threshold of death. His complexion had that bluish pallor that precedes immediate dissolution. My hand was on his wrist. I felt his pulse failing under my finger, until at last it was imperceptible. His eyes closed, and his diaphragm was making those convulsive contractions which indicate that respiration is about to cease, when the knife entered the larynx, and the air was drawn by what really seemed the last effort of the diaphragm into the lungs. The natural hue of his face returned, his pulse was again perceptible, his eyes opened, consciousness was restored, and the patient was alive again. He finally recovered."* In not a few instances, the attacks of dyspnœa are only paroxysmal, with somewhat long intervals between them. In such, the repeated inhalation of chloroform and ether will prove most serviceable to the weary sufferer, and may render an operation unnecessary. But if tracheotomy be employed, the air-tube is to be opened with all the precautions detailed in the preceding section. When there is great difficulty in swallowing, we must trust to enemata containing essence of beef, cream, port wine, quinine, and the tincture of the perchloride of iron, repeating the clyster every four or six hours, according to the rapidity with which absorption takes place.

Directly convalescence is safely established nothing does so much good as change of air—particularly to the seaside. Furthermore, any remaining paralytic symptoms will be best treated by a generous diet and cod-liver oil, supplemented by a good deal of rest, quinine, and ferruginous tonics, small doses of strychnia or nux vomica, and local faradization.

VII. LARYNGITIS.

Cynanche Laryngea, or laryngitis, is not happily a very common disease. In the greater proportion of cases in which it has occurred the morbid action has proved fatal.

Cold and wet acting on unhealthy or enfeebled systems, are commonly the exciting *causes* of the inflammation. Speaking generally, the affection may be said to be peculiar to adults.

The *symptoms* of acute inflammation of the larynx are often at first obscure, as the disease may make its approach in an insidious manner. At the end of some hours, however, they are these: Fever, redness of the fauces, pain referred to the pomum Adami, difficulty of breathing and of swallowing, considerable anxiety, with hoarseness or even complete loss of voice. There are frequent spasmodic exacerbations of these symptoms, causing distressing paroxysms of threatened suffocation. The inspirations are long and attended with a peculiar wheezing sound, as if the air were drawn through a narrow reed. If there be any cough it is harsh and brassy. The face becomes flushed, the eyes are protruded, the lips are swollen, the pulse is hard; and unless relief be afforded, the distress gets greater and greater. The larynx and trachea move with excessive rapidity upwards and downwards, while all the muscles of respiration are brought into action, so that the chest heaves violently. The patient gasps for breath and tries to get to the open window to obtain more air. He soon sinks into a drowsy and delirious state, and then speedily dies suffocated, the chink of

* Diphtheria: its Symptoms and Treatment, p. 75. London, 1861.

the rima glottidis becoming closed from the swelling of the mucous membrane lining it, or from the effusion of serum into the adjacent connective tissue.

In many instances the act of swallowing is attended with so much suffering that nutrient enemata have to be employed. As in dysphagia from some other causes liquids are swallowed with greater difficulty than solids. There is considerable mental distress, until the sensibility gets blunted in consequence of the imperfect oxygenation of the blood.

The inflammation is often of very limited extent: the distress and danger are entirely owing to its situation. To avert the peril our *treatment* must be promptly carried out. The patient is to be closely watched, kept very quiet, and not allowed to talk. The air of his room is to be made warm and moist; while if the apartment be too large to do this effectually, the bed can be covered with curtains making it to resemble a tent. He should frequently inhale the steam of simple boiling water, or of that which is medicated by hydrocyanic acid with a little spirit of chloroform (F. 261), or the spray of a solution of belladonna (F. 262): in the intervals of doing so, it will prove advantageous for him to wear a home-made woollen respirator. But directly it is evident that the remedies are not acting favorably, that the general distress is increasing, and that the blood is not being thoroughly oxygenated, the trachea must be opened. Mr. Porter* has well remarked that tracheotomy allows the organ in which the diseased action is situated perfect repose; it removes the danger of the lungs becoming congested and engorged; it frees the patient from those terrible paroxysms of spasmodic suffocation; and in short it takes the place of all other treatment, which, besides being injurious from loss of time, *is often in itself positively detrimental.* He quotes, also, the opinion of the late Sir William Lawrence, that "bleeding, blistering, and the usual means for subduing inflammation, are here found totally inefficacious." Is it not then a matter for regret that many still recommend the adoption of the antiphlogistic practice, and bid us persevere with it; the usual argument amounting to this, that because all the cases have not died under such a plan, therefore there is every ground for encouragement. Moreover, the administration of mercury proves equally unavailing in checking either the inflammation or the effusion; unless indeed, the disease be dependent upon the poison of syphilis, in which case calomel with opium should be given, and mercurial vapor baths employed, so as rapidly to influence the system. After opening the air-tube, the patient's strength will have to be supported by milk, beef tea, and wine or brandy, if there be—as there usually is—much depression.

Œdema of the glottis will sometimes arise from other causes besides inflammation, and produce the same effects as laryngitis. It is often due to the action of boiling water, or of some strong mineral acid, or of one of the alkalies, taken accidentally into the mouth; either of these corrosives producing sudden contraction of the muscles of the pharynx and larynx, whereby it is expelled through the nostrils and mouth to the great injury of all the tissues over which it passes. The case is different when a caustic poison is voluntarily employed; inasmuch as the individual bent on suicide is prepared to make the necessary effort for swallowing the fluid, which quickly passes into the stomach without injuring the larynx. Then the poison of erysipelas may likewise give rise to œdema glottidis, the inflamma-

* Observations on the Surgical Pathology of the Larynx and Trachea, &c., &c., *pp.* 86, 143. London, 1837.

tion either having its onset in the fauces and larynx, or extending to these parts from the face. To favor the subsidence of the tumefaction, we may (if the symptoms be not urgent) sponge the epiglottis and cavity of the larynx with a solution of the crystals of nitrate of silver, sixty grains to the ounce, as recommended by Dr. Horace Green. Scarifying the œdematous swelling, with the object of permitting the escape of the effused fluid, has been adopted with success. But these plans failing or appearing inapplicable, laryngotomy or tracheotomy becomes our only resource. Yet it is necessary before proposing the operation to be positive as to the diagnosis. For example, a patient in King's College Hospital with renal disease and general anasarca, had considerable dyspnœa. Œdema of the glottis being thought to be the cause, the necessity for tracheotomy was discussed. An examination with the laryngoscope demonstrated, however, that no such condition as was suspected existed; while it proved that there was no disease in the larynx to account for the dyspnœa.

The larynx is also prone to suffer from *chronic* disease. Thus, chronic inflammation and ulceration, owing to the deposit of tubercle, are not uncommon in cases of pulmonary consumption; a species of tuberculosis being consequently known as *phthisis laryngea*. So too, the membrane lining the laryngeal cartilages often becomes thickened and ulcerated in secondary syphilis,—*syphilitic laryngitis*. The ulcers are probably the result of the breaking down of gummata; they may cause considerable loss of substance, destroying perhaps the vocal cords, epiglottis, &c.; but they are amenable to treatment by iodide of potassium and the inhalation of atomized fluids (F. 262), especially of the perchloride of mercury. Again, *fibrous tumors*, *polypi*, *warty growths*, and *epithelial cancers*, all of variable size, may arise from different parts of the larynx, and cause great impediment to the entrance and exit of air. The first systematic account of these growths was published by Ehrmann;* but their diagnosis has been very much facilitated since then by the use of the laryngoscope. They are frequently attached to one or other of the vocal cords, or just above their level. All such tumors have been repeatedly removed with success by the écraseur. Even in epithelial cancer seated about the vocal cords, the growth may be excised. The removal is to be effected through the upper aperture of the larynx, if the tumor be pedunculated; or by an incision through the trachea, in the median line of the neck, when the growth is sessile with its broadest diameter on the floor of the ventricle. In cases of non-malignant disease, a permanent cure will be effected. With respect to cancer, we can reasonably hope to afford much relief; for although the disease is almost certain to return, yet life will probably be prolonged for some months by the operation.

VIII. FOREIGN BODIES IN THE AIR-PASSAGES.

The number and variety of articles which may enter the air-tubes, and give rise to severe or fatal mischief are very remarkable. The most frequent substances which do so are seeds of all kinds, beans, peas, cherry-stones, pieces of hard wood, buttons, pins, small coins, marbles, pebbles, teeth, bits of slate-pencil, beads, screws and nails, portions of bone, and

* Histoire des Polypes du Larynx. Par C. H. Ehrmann. Strasbourg, 1850.

grains of corn. The size of these articles is often such that it would seem almost impossible they could have passed through the chink of the glottis; yet they have done so. Thus, to select only a few examples, Dr. Mott has recorded an instance in which a child, barely eleven months old, inhaled a black shawl-pin two inches long, with a head nearly as large as a small marble.* At Königsburg in Germany, the larynx of a goose became impacted in the windpipe of a boy twelve years old.† M. Bérard had to perform tracheotomy on a boy not quite seven years old, to remove a marble eight lines in diameter.‡ And Sir William Fergusson has had to resort to the same operation to extract a plum-stone from the trachea of a girl seven years of age.§

When the extraneous substance is of an animal or vegetable nature, it is apt to swell considerably owing to its imbibing moisture; so that a small bean or pea has been known to increase to thrice its size in a few days. In a few fortunate cases the material has become softened and broken up, permitting of its expulsion piecemeal; when retained, as it usually is, the foreign body becomes incrusted with mucus, or with lymph, or even with a few grains of carbonate or phosphate of lime. The substance either gets lodged in one of the ventricles of the larynx, or it becomes fixed between the chordæ vocales, or it may be arrested in the trachea, or it will descend into one of the bronchial tubes, especially into the right.

Symptoms.—The entrance of the foreign body usually occurs during a strong and sudden inspiration; it immediately gives rise to a violent spasmodic cough, dyspnœa, and a sense of impending suffocation; and sometimes it even causes sudden death by arresting the respiration. After a few minutes, the violence of the first symptoms usually abates for a time; the cough and dyspnœa returning at variable intervals. Sometimes the calm lasts for many hours; usually it is short, of twenty or thirty minutes' duration. The subsequent symptoms will depend upon the situation in which the foreign body is retained. Thus, if it remain in the *larynx*, there will usually be violent, harassing, and suffocative cough; perhaps loss of voice, or inability to speak above a whisper; probably pain in swallowing, with tenderness over the part; and noisy hissing respiration, with more or less dyspnœa. When the substance descends below the larynx, it is seldom retained in the trachea, but passes on into *one of the bronchial tubes*—in the great majority of instances into the right, being directed to this by the bronchial septum. If, under these circumstances, auscultation and percussion be practiced, it will be found that air does not enter the obstructed lung at all, or, where the obstruction is only partial, that it fills the lung incompletely. Hence there will be a complete loss or a diminution of resonance on percussion, with diminution or absence of the respiratory murmur on auscultation. The foreign body not unfrequently *plays up and down the trachea*, under the influence of fits of coughing. This change in position gives rise to severe spasmodic attacks of dyspnœa; a peculiar sensation of movement appreciable by the patient; and a sound of motion detected by auscultation, as well as possibly to a flapping or valve-like sound produced by the foreign body being forced against the rima glottidis in expiration.

Supposing that the substance is not expelled or removed, the patient will be liable to be suffocated at any moment from the foreign body pressing up

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* New Hampshire Journal of Medicine, p. 197. April, 1852.
† London Medical Gazette, vol. xi, p. 559. 1850.
‡ Archives Générales de Médecine. 2d series, tom. ii, p. 125. Paris, 1833.
§ A System of Practical Surgery. Third edition, p. 648. London, 1852.

into the larynx under the influence of a fit of coughing; or if he escape this risk, there is the fear of inflammation with all its dangers. After the subsidence of the immediate symptoms, the foreign body sometimes gives rise to no appreciable inconvenience for many weeks or months. Louis relates such an instance, where the patient did not (after the first few minutes) experience a bad symptom for twelve months, at the end of which time he coughed up a cherry-stone followed by such copious expectoration that he died from exhaustion in three days.* Dr. Condie attended a child who continued free from all symptoms of disease for a week, after the first symptoms had subsided: pneumonia then set in, which ended fatally on the fifth day, when a large bead was found obstructing the right bronchus.†

Occasionally death occurs during the act of vomiting, owing to some of the ejected matters lodging against the rima glottis, or even passing down the windpipe. Thus, Corvisart being desirous of exercising a close supervision of the clinical wards at La Charité, visited them one evening unexpectedly. The steward, who had been indulging in a hearty meal, was taken by surprise, and became sick; but making a violent effort to repress the vomiting, he fell to the ground and expired. On examining the body, the larynx, trachea, and bronchial tubes were found filled with half-digested food.‡

Diagnosis.—The symptoms set up by extraneous bodies in the respiratory organs may be imitated by different diseases. But before mentioning these, it should be remembered, that if the foreign substance be entangled in the ventricles, or between the vocal cords, the use of the laryngoscope will not only enable the body to be seen, but must likewise show how and where it can best be seized so as to permit of extraction. Groping about in the dark, therefore, under such circumstances, can no longer be justifiable. When the body has passed beyond the upper portion of the larynx, the symptoms produced are to be distinguished from those of *croup*, by the state of the pulse and skin, which are rarely excited, until the foreign substance has had time to give rise to inflammation; by the difficulty of breathing existing during expiration and not most severely during inspiration as in croup; by the absence of the croupy character of voice; and by the complete intermissions. The case will be known from *hooping-cough* by the history, the want of the peculiar hoop, and by the absence of great dyspnœa during inspiration. The diagnosis from *spasm of the glottis* is to be made by considering the history, and by the non-existence of any auscultatory signs. And lastly, the symptoms will be proved not to be owing to *the impaction of extraneous substances in the pharynx and œsophagus*, by examining these passages with the finger and probang. The want of this latter precaution has proved fatal. Thus, a man, while eating, was seized with symptoms of suffocation and difficult deglutition; the trachea was opened; but as nothing could be found, it was concluded that the substance had descended into one of the bronchial tubes, until after death the surgeon was surprised at discovering it fixed in the œsophagus.

There will, however, be but little difficulty in forming a correct diagnosis in the majority of cases, if the history be carefully attended to. For example, suppose a healthy individual "has been playing with a grain of corn, bean, pebble, or similar body, and has been suddenly seized with symptoms of suffocation, violent spasmodic cough, lividity of the face, pain

* Memoir on Bronchotomy, in Memoirs of the Royal Paris Academy of Surgery. Translated by Ottley, p. 277. London, 1848.

† Diseases of Children. Third edition, p. 366. Philadelphia, 1850.

‡ Laennec on Diseases of the Chest. Translated by Forbes. Fourth edition, p. 131. London, 1834.

in the upper part of the windpipe, and partial insensibility, the presumption will be strong, that the substance, whatever it may have been, has slipped into the air-passages, and is the immediate and only cause of the suffering which the surgeon has been sent for to relieve. The presumption will be converted almost into positive certainty if the person was just previously in the enjoyment of good health; if he was romping, jumping or laughing at the moment of the accident, with the substance, perhaps, in his mouth, or while attempting to throw it into that cavity; and especially, if the symptoms, after having been interrupted for a few minutes, continue to recur, with their former, or even with increased intensity, at longer or shorter intervals."*

Pathological Effects.—The most common is inflammation of the mucous membrane, perhaps going on to ulceration; the latter effect is generally confined to the tissues in contact with the extraneous substance. The normal secretion of mucus is always increased; while frequently the fluid becomes muco-purulent, and in some instances the bronchi have been found loaded with it. When the foreign matter is retained in one of the bronchial tubes, it may produce pulmonary collapse if it completely obstruct the tube; or inflammation of the corresponding lung may be set up, giving rise to all the ordinary symptoms of pneumonia. Abscesses also form at the seat of obstruction. In a few instances pulmonary emphysema has been induced; in others, pleurisy leading to effusion; and in a very small number, inflammation of the heart and its investing serous membrane. Mr. Herbert Mayo has recorded a case in which a boy twelve years old died in consequence of the inhalation of a grain of rye; pulmonary irritation with the most fetid expectoration followed, and hectic fever set in which proved fatal. On dissection the extraneous body was discovered in an abscess common to the lung and liver; the latter gland having become involved by the extension of the inflammation through the diaphragm.†

Treatment.—The foreign substance is sometimes spontaneously expelled, especially during a paroxysm of cough and dyspnœa. This has occurred when the patient has been laid upon a bed with his head hanging over the edge; and in a few instances when he has been in the erect posture. The time at which this fortunate termination can be hoped for is variable: it may happen a few minutes after the accident, or months subsequently. Dr. Webster has recorded an instance where a cherry-stone was expelled sixty-eight days after its introduction, and the patient recovered after having suffered from pneumonia, abscess, and hectic fever.‡ Sir Thomas Watson refers to an instance where a grain of barley was spontaneously ejected seven years after the accident, and the patient, who had suffered from repeated attacks of hæmoptysis, got well.§ In a few instances the substance has been got rid of by inverting the body, and smartly striking the back of the chest to dislodge the obstructing agent; but the latter, on touching the glottis, gives rise to such severe spasm, that it very rarely passes out.

These facts have led practitioners to attempt the expulsion of extraneous substances by the use of medicines, especially by sternutatories and emetics; but the anticipated result has so very rarely ensued, that the practice ought to be abolished, especially as it is not without danger, and causes the loss of valuable time. Since, then, no patient can be regarded as safe who has

* A Practical Treatise on Foreign Bodies in the Air-Passages. By S. D. Gross, M.D., &c., p. 90. Philadelphia, 1854.

† Outlines of Pathology, p. 506. London, 1836.

‡ The Lancet, vol. i, p. 802. London, 1830.

§ Lectures on the Principles and Practice of Physic. Third edition, vol. ii, p. 225. London, 1848.

a foreign body in any portion of the windpipe, how is it to be got rid of? When the body is fixed in the larynx so that it cannot be seen by the laryngoscope, laryngotomy should be performed as early as possible; but when it has descended lower, and perhaps in all cases in young children, the trachea ought to be opened. The substance may be ejected through the glottis, or through the artificial opening directly the latter is made; but, should this not take place, then the patient's body had better be inverted and a few smart taps made to dislodge the substance. The inversion is not likely to be followed by any bad consequences, because the patient will breathe through the artificial opening, and hence the coin, or bean, or whatever it may be, will not give rise to that severe spasm of the glottis which it would otherwise do. In the well-known case of Mr. Brunel, April, 1843, in which a half-sovereign slipped through the chink of the glottis while this gentleman was amusing some children with conjuring tricks, all attempts to procure the expulsion of the coin by sloping his body downwards failed, in consequence of the violent coughing that ensued. Three weeks after the accident, Sir Benjamin Brodie opened the trachea, and it was tried to reach the coin with forceps, but without success. Sixteen days subsequently, the wound in the trachea having been kept in an open state, Mr. Brunel's body was inverted on a movable hinged platform to which he had been firmly strapped. The back of the chest was then struck with the hand, two or three efforts to cough followed, the coin was felt to quit the bronchus, and immediately afterwards it struck against the upper incisor teeth and fell on the floor. Recovery took place without any drawback.

The question may properly be entertained whether the foreign body might not be discharged without opening the windpipe? In a case which was under the charge of Dr. Duncan of Edinburgh, shortly after the successful issue just related, a man who had got a shilling in his larynx was relieved of the intruder by being suddenly turned topsy turvy without any other operation. Usually, however, this proceeding causes most dangerous cough and dyspnœa. Possibly the spasm of the glottis might be overcome by the inhalation of chloroform without opening the trachea, but I am not aware of any instance where such a plan has been tried. If, however, a surgeon determine to resort to it, he must be prepared to perform tracheotomy immediately, in case of the necessity arising.

When the extraneous body resists all efforts to remove it, the wound in the trachea should be kept open to favor its extrusion subsequently. Where the operation, however, is successful, the incision ought to be immediately closed by two or three interrupted sutures or by strips of adhesive plaster.

IX. LARYNGISMUS STRIDULUS.

Laryngismus stridulus [from *Λαρυγγίζω* = to vociferate with all his might; *Strideo* = to make a hissing noise], infantile laryngismus, spurious croup, or child-crowing, is a spasmodic disease occurring in infants chiefly during the period of dentition—before the completion of the second year. The affection consists of a temporary, or partial, or complete closure of the rima glottidis, by which the entrance of air into the lungs is impeded or stopped. The deaths registered from this disease in England, during 1866, were $\frac{\text{Males } 195}{\text{Females } 105} = 300$; of which total 168 were infants under one year of age.

Symptoms.—Infantile laryngismus is unattended by fever, almost its only symptom being the interruption of the breathing. The first seizure frequently occurs in the night, the child having been often apparently quite well when put to bed. Perhaps the attack is so slight, that after two or three crowing inspirations the little patient falls asleep again. In other instances there may have been irritability and restlessness, perhaps disordered bowels, for a few days. Then the child is suddenly seized with dyspnœa, it struggles and kicks, is unable to inspire, and seems about to perish from suffocation. Presently the spasm gives way, air is drawn in through the chink of the glottis with a shrill, whistling, or crowing sound, and the paroxysm is over; sometimes to return shortly, or in a few hours, or not perhaps for several days. In severe forms the symptoms may have more of an epileptic character, there being suspended breathing, turgidity of the veins of the neck, and carpopedal contractions. Now and then the child seems dead during these intervals of suspended respiration, until, at the end of a couple of minutes or a few seconds longer, there is a faint gasp followed by thin stridulous breathing. There is, however, much fear of death really happening during one of these paroxysms.

Pathology.—This affection was carefully investigated by Dr. Ley, who attributed it to pressure made by enlarged glands in the neck or chest upon the recurrent nerve, or upon some part of the eighth pair of nerves. The pressure subverts the exact antagonism by which the glottis is automatically and involuntarily kept open, and allows its margins to come together, thus occasioning the dyspnœa and peculiar kind of inspiration so much resembling that of croup. It was reserved for Dr. Marshall Hall, however, to give the immediate explanation of the phenomena of this disease, by showing that it is to be attributed to some source of irritation producing reflex spasm—to an excitation of the true spinal excitomotory system. It *originates*, says Dr. Marshall Hall, in—

1. *a.* The *trifacial nerve* in teething.
   b. The *pneumogastric*, in over or improperly fed infants.
   c. The *spinal nerves*, in constipation, intestinal disorder, or catharsis.

These act through the medium of—

2. The *spinal marrow*, and,
3. *a.* The *inferior* or *recurrent laryngeal*, the constrictor of the larynx.
   b. The *intercostals* and *diaphragmatic*, the motors of respiration.

Functional disorders of the brain, cerebral ramollissement, apoplexy, a rachitic state of the bones of the skull, organic disease of the cervical portion of the spinal cord, and scrofulous adenitis, have all been regarded as possible causes of infantile laryngismus.

Treatment.—During the paroxysm the treatment should be the same as that employed in resuscitating still-born children. Hot water to the lower parts of the body, with cold affusion to the head and face; slapping the chest and nates; exposure to a current of cold air; the gentle inhalation of chloroform, and artificial respiration if necessary, taking care to draw the tongue well forwards. The vapor of ether or ammonia can also be applied to the nostrils; while, as a last resource, tracheotomy ought to be performed.

The subsequent remedies must consist of mild purgatives and antispasmodic tonics; and, above all, change of air. Belladonna, commencing with one-sixth of a grain thrice daily, is sometimes useful, while its efficacy may be augmented by combining the bromide of potassium or of ammo-

nium with it, or the sulphate of zinc in gradually increasing doses. The diet ought to be very simple: a child at the breast should not be otherwise fed, but the practitioner should make sure that the milk is good. Many of the diseases of infants are caused by the silly obstinacy of some mothers, who are only happy when overloading the stomachs of their children.

X. BRONCHITIS.

Inflammation of the mucous membrane of the bronchial tubes is one of the most common of the pulmonary diseases which come under the notice of the practitioner. Bronchitis [from *Βρόγχος* = the windpipe; terminal *-itis*] may be acute or chronic, and one or both lungs may be affected throughout, or only a portion of these organs—usually the upper lobes.

The fatality of bronchitis in England is much greater than is commonly believed. The deaths registered from it, as compared with those due to phthisis and pneumonia, are as follows:

	1860.	1861.	1862.	1863.	1864.	1865.	1866.
Bronchitis . .	32,347	30,986	32,526	32,025	38,969	36,428	41,334
Pneumonia, . .	25,264	22,914	23,718	24,181	24,470	22,489	25,155
Phthisis, . .	51,024	51,931	50,962	51,072	53,046	53,734	55,714

For the estimated population in these years, as well as for the total number of deaths from all causes, reference should be made to the section (p. 232) on the eruptive fevers.

1. ACUTE BRONCHITIS.—This is a dangerous disorder; partly owing to the way in which it interferes with the due oxygenation of the blood, and in some measure because of the frequency with which the inflammatory action spreads to the capillary bronchi as well as to the vesicular texture of the lungs. The danger, however, principally exists amongst the young and old. Thus, of the 41,334 deaths registered from bronchitis in 1866, those occurring in children under five years of age were $\frac{\text{Males } 8812}{\text{Females } 7493} = 16{,}305$; the number for infants under one year being 11,754. Then, from 5 to 45 years we find only $\frac{\text{Males } 1663}{\text{Females } 1605} = 3268$ fatal cases, while during the next 40 years (45 to 85) they reach to 20,781.

Symptoms.—The chief symptoms consist of fever, a sense of tightness or constriction about the chest, sternal pain or tenderness, hurried respiration with wheezing, severe cough, and expectoration—at first of a viscid glairy mucus, which subsequently becomes purulent. The pulse is frequent and often weak; the temperature in the axilla varies from 99.5 to 102°; the tongue is furred and foul, and there is headache, together with lassitude, sickness, and often much mental uneasiness or even great anxiety.

Inflammation of the larger and medium-sized tubes is attended by less severe symptoms and is much less destructive to life than *general and capillary bronchitis*, in which all the ramifications of the bronchi are affected. This latter form of the disease is chiefly seen in the very young and old, being rare in adults: while it is readily recognized by its tendency to produce asphyxia; by the paroxysmal attacks of dyspnœa [*Δυς* = difficulty + *πνέω* = to breathe], or of orthopnœa [*Ὀρθὸς* = erect + *πνέω*], as well as by the congestion of the surface of the body, the perpetual cough, and the extreme general restlessness. The patient is obliged to sit up in bed; the

urine is scanty, deep-colored, of high specific gravity, and sometimes slightly albuminous; the skin is clammy; the pulse is regular but feeble, and from 120 to 150; the prostration rapidly increases, and we may have anasarca of the feet and legs, while in fatal cases there will soon be somnolence, muttering delirium, coma, and death. That severe suffering not uncommonly ending in the destruction of life, should thus result, is only what we might expect, for to congest and thicken the lining mucous membrane of the capillary bronchia, and then to coat it with viscid mucus, is virtually to completely occlude these air-passages.

From time to time it happens during the progress of a case of bronchitis, that one or more of the tubes become choked up with the viscid phlegm; and we have, as the result, *pulmonary collapse*, a portion of the lung being emptied of air. Thus, supposing a plug to form in one of the bronchi, the lung beyond it in expiration soon forces out the air by the side of the foreign body; but each inspiration draws the obnoxious substance towards a narrower part of the tube, which it seems effectually to cork up. The consequence is, that as each succeeding expiration expels the air retained behind the obstacle, while none is inspired to take its place, the sacs or vesicles must collapse. Then the collapsed portion of the pulmonary tissue becomes condensed; this condensation having been formerly considered as due to inflammation, whence it was termed *lobular pneumonia*. One frequent result of the collapse is the production of vesicular emphysema; so that the loss of function in the airless part of the lung is compensated for by an increase of volume in the non-obstructed portion.

On practicing *auscultation* in the early stage of acute bronchitis, two *dry* sounds will generally be heard, viz., *rhonchus* and *sibilus;* both of which indicate that the air-tubes are partially narrowed, owing to the mucous membrane lining them being dry and tumid. Rhonchus in itself need give us no anxiety, as it belongs entirely to the larger divisions of the bronchial tubes; sibilus, on the contrary, bespeaks more danger, since it denotes that the smaller air-tubes and vesicles are affected. After a time, the inflamed mucous membrane begins to pour out fluid—a viscid, transparent, tenacious mucus is exhaled; this constituting the second stage of the inflammation. Two very different sounds to those just noticed are then to be detected, viz., *large crepitation* and *small crepitation*, or, as they are often called, the *moist* sounds. As the air passes through the bronchial tubes it gets mixed, as it were, with the mucous secretion, so that numerous air-bubbles keep forming and bursting. When this occurs in the larger branches, it gives rise to large crepitation; when in the smaller, to small crepitation. We have therefore rhonchus and large crepitation as, respectively, the dry and moist sounds of the larger air-passages; sibilus and small crepitation as those of the smaller branches. On practicing *percussion*, no appreciable alteration in the resonance of the chest will usually be discoverable; bronchitis in this respect offering a marked difference to the dulness which is present in pneumonia. If the lungs, however, are acutely emphysematous, there will be increased resonance; while if there be collapse of a large portion of the pulmonary tissue from the obstruction produced by the pressure of an enlarged bronchial gland upon a tube, or from the choking-up of the latter with inspissated mucus, the percussion-note will be dull.

The occurrence of *bronchitis during childhood* is always to be dreaded, inasmuch as the disease has a twofold source of danger,—pulmonary collapse and capillary bronchitis. For the production of the first, little is needed beyond a copious secretion of viscid mucus with sufficient debility to prevent its expectoration, and so allow of its choking up some of the smaller bronchi. Should this occur, we shall find that the difficulty of

breathing increases, without any exacerbation of the fever; and that where there was previously resonance on percussion there is substituted dulness and bronchial respiration. If this condition be mistaken for pneumonia and venesection and leeches and antimony be resorted to, the severity of the symptoms will be increased, and possibly a fatal result induced; while, on the contrary, under the early influence of stimulants and rubefacient liniments, relief may often be speedily given. The second element of peril—capillary bronchitis—is that in which the smaller air-tubes become intensely inflamed, this inflammation quickly ending in a copious secretion of pus. This severe and often fatal affection may not only result from an extension of the inflammation of the larger air-tubes, but, in infants especially, it may also occur primarily. It chiefly produces great acceleration of the breathing, so that the respirations are repeated from thirty to forty times in a minute; distressing and frequent cough; great anxiety of countenance with frequent flushings; heaviness of the eyes with injection of the conjunctivæ; extreme restlessness; and great frequency with weakness of pulse. The diagnosis is not free from difficulty, for the symptoms bear a striking resemblance to those of pneumonia; and it is by no means easy to practice percussion or auscultation in the alarmed and restless child. If we succeed in doing so, however, we shall obtain a natural degree of resonance on percussion; while with the ear to the chest we shall detect a subcrepitant râle, a moist sound which is larger than the small crepitation of pneumonia, and yet smaller than the large crepitation of simple bronchitis. There is often, also, rhonchus and sibilus; all these being best heard at the back and bases of the lungs. In favorable cases these sounds are gradually replaced by large crepitation and the vesicular murmur; while the general disturbance subsides. On the contrary, where death is about to happen, the face assumes a livid hue, the cough becomes smothered, the respiration more labored, and there is great drowsiness. Then for a few hours the sufferings appear lessened, unless under the influence of a paroxysm of dyspnœa, and the child quietly dies.

Prognosis.—In the bronchitis of adults, when relief is not afforded by the copious expectoration, or by remedies, the disease assumes a very dangerous character. The strength becomes much reduced, signs of great pulmonary congestion ensue, and symptoms of partial asphyxia often follow that soon end in death. With favorable cases, however, the affection begins to decline between the fourth and eighth day, and shortly either entirely subsides, or passes into the chronic form. Probably from one-half to three-fourths of those attacked with capillary bronchitis die between the sixth and tenth days of the disease.

Treatment.—The patient is to be confined to his bed. The temperature of the room may vary from 65° to 70° F.; and it is usually beneficial to have the air moist, as recommended when speaking of diphtheria. Beef tea, milk, arrowroot, or gruel, or corn flour, tea with milk, and a mucilaginous drink (F. 19), ought to be allowed; while if there be indications of debility, white wine whey (F. 10) will prove a good restorative. An agreeable demulcent drink can also be made with sarsaparilla, squills, and barley-water (F. 238).

Then, after a brisk purgative, a saline mixture containing ipecacuanha or squills (F. 348) should be prescribed; or, if there be any depression, a stimulating expectorant (F. 235) must be ordered. Gentle counter-irritation to the front of the chest by dry cupping, turpentine stupes, or sinapisms, will also prove valuable. Should the phlegm appear to accumulate in the bronchial tubes, an emetic (F. 231, 233) will readily remove it; or warm water inhaled as spray (F. 262) will suffice to do so, at the same time

that the application is grateful. When Physician to the Farringdon Dispensary, where the patients were very poor, I was in the constant habit of successfully treating acute bronchitis from the commencement with stimulating expectorants (ammonia, squills, and senega being the chief ingredients in the prescription), good beef tea, the inhalation of the steam of hot water, and counter-irritation by means of rubefacient liniments or turpentine stupes. Opium, cautiously given, often affords relief for the night; though it is not to be employed if there be any indications that the blood is insufficiently aerated—if the complexion be dusky or bluish.

The treatment of bronchitis in children ought to be subordinate to the degree of inflammatory action, and the strength and constitution of the patient; regard being likewise paid to the fact of the disease being primary, or of its setting in secondarily to some other affection—as measles, hooping-cough, &c. As in the adult, simple bronchitis in the young often ceases after a few days without medicine. But with the latter, great care is needed to guard against the occurrence of pulmonary collapse, and so the child is to be kept in a warm and comfortable atmosphere, to be allowed plenty of milk and broths and demulcent drinks, and to be daily watched. In acute cases, the chief remedies are ammonia and ipecacuanha and senega; with linseed poultices to the chest, and occasionally sinapisms or somewhat irritating liniments. If pulmonary collapse take place, a stimulating emetic may be given once; followed by a warm bath, good beef tea, milk or cream, and wine or ammonia with ether. And then after all forms of the disease, a nourishing diet with plenty of milk, ammonia and bark, cod-liver oil, and a pure air to breathe, will form the necessary treatment during convalescence. When the debility is great, port wine will be serviceable; while if there be any difficulty in insuring the digestion of the cod-liver oil, this agent may well be introduced into the system by freely rubbing the thoracic and abdominal walls with it twice or thrice in each twenty-four hours.

2. **CHRONIC BRONCHITIS.**—Chronic inflammation of the bronchial tubes is very common, particularly in advanced life. The first attack usually occurs during the winter. The disease has a great tendency to recur again and again: some people indeed seem to be scarcely ever free from it. The slighter forms are indicated only by habitual cough, more or less shortness of breath, and copious expectoration; these symptoms being always aggravated by exposure to cold and wet, or by bad living. The physical signs of chronic bronchitis are, chiefly, slightly impaired resonance on percussion, especially low down posteriorly; while the vesicular murmur is feebly heard, and is mingled with rhonchus and sibilus and moist crepitation. The majority of "winter coughs" in old people are examples of bronchial inflammation of a low lingering kind. After repeated attacks many of these cases end fatally somewhat suddenly. They are apt to become complicated with valvular disease of the heart, or with contracted gouty kidneys; dropsy and albuminuria setting in. Chronic bronchitis arises idiopathically, or it may follow an acute attack. The morbid action is often associated with other pulmonary lesions. A general dilatation of the bronchi, especially of the finer tubes, occasionally results from this disease, as well as from hooping-cough; this dilatation keeping up, for a time, excessive and fetid muco-purulent secretion—bronchorrhœa. Chronic bronchitis is seldom fatal in itself; but it is often the indirect cause of death by leading to other diseases.

There is a peculiar and severe form of this disorder, occurring in aged people, which deserves notice. It has been described as *peripneumonia notha* (bastard peripneumony), or *catarrhus senilis*, or *subacute bronchitis;*

and it really consists of a subacute attack of general or capillary inflammation of the tubes. In these cases there is often only the appearance of a violent catarrh, with more or less severe dyspnœa, and an excessive secretion of opaque frothy mucus loaded with pus-cells and columnar epithelium (visible with a ¼-inch object glass). The symptoms are frequently marked relieved by remedies which cause a free and copious expectoration: an emetic of ipecacuanha with a little ammonia ofttimes has a marvellous good and speedy effect. Now and then it happens that insufficient care is taken at the onset; the feverish and catarrhal phenomena being possibly at first very moderate, and apparently unimportant. But after a few days these symptoms suddenly become considerable: there is the orthopnœa and tendency to asphyxia already noticed; we find a rapid pulse with hurried respiration; the urine is scanty and perhaps albuminous; great prostration soon sets in; and a fatal event occurs so quickly, that it is probably unexpected. Capillary bronchitis sometimes proves fatal by the accumulated mucus, which the patient has not the power to expel, causing suffocation, while in other instances deficient oxygenation of the blood leads to coma.

Plastic bronchitis is a rare form of bronchial disease, characterized by the formation of solid or tubular concretions of exudation-matter within the bronchial tubes. It is a disorder which runs its course very slowly. The chief symptom is the occasional expectoration of casts of the tubes, very little suffering being caused by the bringing up of small fragments, while the expectoration of moulds of notable size is usually preceded by dyspnœa, dry cough, and not unfrequently by hæmoptysis. Sometimes the hæmoptysis is the first symptom, the concretions being detached, but not expelled from the bronchi. The bleeding frightens the patient, and perhaps is really abundant. In exceptional instances there may be slight aneurismal or some other form of acute hemorrhage into the tubes, the casts consisting of decolorized coagulated blood. Suspended in water, the branching appearance presented by these fibrinous moulds explains their nature.

Cases of plastic bronchitis not uncommonly last for years, the patients having troublesome seizures, attended with the peculiar expectoration, every few weeks or months. Medical treatment seems to have no permanent effect upon this disease, but I believe that the prolonged use of the carbonate of ammonia will prove more useful than the employment of most other drugs. Where there is hemorrhage, however, we must trust at the time to gallic acid or turpentine or iron-alum, with perfect quiet. Overactive remedies, especially of an alterative or depressing nature, will only be productive of great mischief. In fact, the symptoms show the need for simple nourishing food, with cod-liver oil. Sea air can also be recommended.

Bronchitis occurring secondarily in blood diseases is not uncommon, though often very troublesome. Thus, *typhoid bronchitis* not very unfrequently occurs during typhoid fever; in severe cases greatly aggravating the danger of this disease. We may also have *gouty* or *rheumatic bronchitis*, only to be cured by the relief of the constitutional disorder. Rare cases have been observed where attacks of gout and bronchitis have seemed to alternate, the latter subsiding on the development of a smart fit of the former. So again, persons poisoned to the second, or to the tertiary degree, by syphilis, are apt to suffer from *syphilitic bronchitis;* giving rise to troublesome substernal pain or sense of constriction, more or less cough and dyspnœa, slight muco-purulent expectoration, night-sweats, great debility, and wasting. Iodine spray inhalations (F. 262) are useful in these cases in conjunction with anti-syphilitic remedies. It should be remembered, moreover, that occasionally this last variety of bronchitis assumes the acute form, while from time to time instances are met with where ulcerations of

the mucous membrane of the bronchi are set up. Under these circumstances disintegrated gummata will usually be found, so that these cases are more properly to be regarded as instances of syphilitic phthisis.

Severe examples of all varieties of chronic bronchitis, when accompanied by abundant offensive expectoration, are apt to be mistaken for cases of gangrene of the lung or for phthisis, especially if there be also dilatation of the bronchi. Professed consumption curers often commit the latter error in diagnosis, and then vaunt their very ordinary as extraordinary cures.

The *treatment* of chronic bronchitis obviously depends very much upon the age and constitution of the patient. The cases which have fallen under my own observation have been most benefited by various stimulating expectorants, such as combinations of ammonia, senega, ipecacuanha, conium, spirit of chloroform, squills, and ether (F. 235, 237, 239, 243, 245); by tonics (F. 371, 375, 386); by cod-liver oil, milk, and good nourishing food, and by the moderate use of wine or some other stimulant. When the disease is due to the poison of syphilis, it will be most readily cured by iodide of potassium and the compound calomel pill. If the patient be gouty or rheumatic, colchicum and iodide of potassium often work wonders. In mechanical bronchitis, from fifteen to twenty grains of larch or Venice turpentine (Terebinthina laricea) made into pills with liquorice powder, and administered thrice daily, frequently prove of great service. Supposing there to be any difficulty in throwing off the muco-purulent secretion, we shall do most good with ammonia, squills, spirit of chloroform, and spirit of ether or of nitrous ether. Sometimes an emetic of ipecacuanha acts most favorably in these cases, guarded with a dose of the aromatic spirit of ammonia lest it should cause much depression.

The inhalation of simple vapor is generally useful. Where the secretion is excessive, turpentine or creasote (F. 260) inhalation may deserve trial; or these remedies in the form of spray (F. 262) can be had recourse to with almost certain profit. Counter-irritation by sinapisms, turpentine stupes, or rubefacient liniments, will give great relief, while flying blisters frequently do good. Patients often subsequently derive advantage from covering the chest with a large warm or chalybeate plaster. And finally, susceptible subjects may ward off bronchial attacks by wearing the pneumoclime of Mr. Jeffreys, when in the open air at night or during unfavorable weather, although this instrument would seldom be required by men if they did but allow the protecting medium which they naturally possess to grow freely. I am sure that I have again and again witnessed the most marked benefit arise in what are called "weak-chested" individuals, from a cultivation of the mustache and beard.

XI. BRONCHIECTASIS.

Dilatation of the bronchial tubes, or bronchiectasis, was first described by Laennec, about the year 1818; when he showed how this organic lesion had previously been overlooked both by the anatomist and the practitioner.

The *dilatation may be uniform*, disturbing the calibre of one or more tubes for a variable length; or it will be *saccular*, consisting of one or several sacculated or bead-like dilatations, affecting particular points of

one or more tubes, and giving rise to the appearance of cavities. The structure of the walls of the dilated parts is altered. Thus, their mucous lining becomes villous and ultimately ulcerated when the natural secretion cannot be thoroughly got rid of; so that it accumulates and decomposes, and sets up much irritation. Then, the muscular and elastic coats are found to have wasted, their elements having undergone a granular degeneration. The mucus in the bronchiectases is generally abundant; but it may either be natural in character, or thick and of a gray-yellow tinge, or inspissated and very fetid from decomposition. It is not improbable that the peculiar smell of the sputa depends upon their decomposition producing butyric and acetic acids, ammonia, and sulphuretted hydrogen.

The *condition of the lung-tissue surrounding the dilatations* has been better described by Dr. Grainger Stewart than by any other writer that I am acquainted with.* He shows that there are various states: (1) The lung-tissue may be unaltered; being found soft, spongy, and crepitant. (2) It will be collapsed or atrophied. There is neither a spongy nor an indurated condition. The atrophy is sometimes so extensive that nought remains in the affected part save dilated bronchi. (3) The pulmonary tissue is densely consolidated, constituting what some observers have called cirrhosis, and others fibroid degeneration of the lung. Under these circumstances it is said, that with occlusion of the air-cells there is also a marked increase of the fibrous tissue; a condition believed by Sir Dominic Corrigan to be identical with cirrhosis of the liver. (4) The surrounding lung-tissue forms an abscess, in the centre of which the thin walls of the dilated bronchus can be seen. And (5) the walls of the bronchi and the surrounding lung-tissue are destroyed by gangrenous inflammation. M. Briquet first drew attention to this variety of pulmonary gangrene, and his observations have since been confirmed by others. His chief conclusions are, that there is a form of dilatation of the bronchi in which the extremities of the tubes are dilated in sacs, which may be with or without dilatation of other parts of the bronchial tree; and that these dilated extremities are liable to gangrenous destruction independently of gangrene elsewhere.

Very different opinions have been promulgated as to the *cause* of these dilatations. Laennec believed that they were only met with in cases of chronic mucous catarrh; a temporary dilatation resulting from a voluminous sputum, and being rendered permanent by the successive secretion and stagnation of similar ones. This mechanical explanation was disputed by Andral with regard to one form of bronchiectasis, which he believed was the result of a vital hypertrophy. And so conflicting views have prevailed according to the skill with which they have been advocated; the theories of Sir Dominic Corrigan, Professor Gairdner, and Dr. Stokes, having been the most extensively adopted. After examining these, and considering the conclusions deducible from his own observations, Dr. Grainger Stewart believes that the essential element in these cases is atrophy of the bronchial wall; so that the thinned and weakened tissue readily yields to the pressure of air, just as the force of the blood will produce an aneurismal tumor when the middle coat of an artery becomes weakened. Moreover, the enfeebled and dilated bronchi encourage the accumulation of mucus; while this decomposing secretion leads to irritation and inflammation of the mucous membrane, the growth of villous processes from it, the formation of increased connective tissue in the walls, irritation of the cartilages, and frequently to consolidation of the surrounding lung with abscess or gangrene.

* On Dilatation of the Bronchi, or Bronchiectasis, p. 9. Edinburgh, 1867. This essay originally appeared in the Edinburgh Medical Journal, pp. 39-58. July, 1867.

The *symptoms* by which this morbid condition can be recognized in its early stages are not very distinct. The general history is that the patient has caught a violent cold, that this has been followed by a frequent spasmodic cough, that there has been considerable expectoration, and that the sputum has been occasionally tinged with blood. Advice has been had without as much relief being obtained as was hoped for. Hence, the patient requires a consultation; or he enters the hospital. His chief complaints are then, a progressive loss of strength; more or less dyspnœa on exertion; a moist cough, which comes on in paroxysms; an offensive odor about the breath and body generally; and especially an abundant expectoration of grayish nummular sputa, occasionally mingled with fragments of fibrin which have been moulded in some of the bronchi so as to form casts, but always possessing a most fetid odor. This fetor is distinct from that met with in gangrene, while when concentrated it is most disgusting. It is due to the retention and decomposition of the thick mucous or puriform secretion from the walls of the bronchiectases; the secretion being occasionally so abundant that a pint or even more may be expectorated in the twenty-four hours. The temperature of the body is not raised above the healthy standard.

The *physical signs* vary according to the extent of the dilatations, the amount of their contents, and the state of the surrounding lung. Obviously, percussion will elicit a more resonant sound than natural if the dilatation be near the surface of the lung and empty; but no clear note can be obtained if the tube be well surrounded with condensed pulmonary tissue. On auscultation, coarse mucous rhonchus is heard; this being generally most distinct about the lower lobes. Sometimes there is distinct gurgling, exactly like that which is heard in a tubercular cavity. To prevent any error in diagnosis it should be remembered that these sounds in bronchiectasis are usually detected over the middle and lower parts of the lungs, the apices being healthy; the phenomena occasionally disappearing as the dilatations are emptied by a copious expectoration, and then returning. In tubercular disease the upper lobes are, as a rule, those first attacked; while the physical signs are much more constant.

The *treatment* must first be directed to maintaining the general health by nourishing food and cod-liver oil. Then, to diminishing the secretion from the bronchial mucous membrane by such remedies as the compound tincture of benzoin, balsam and tincture of tolu, or turpentine; by counter-irritation to the chest-walls with the liniment of iodine or croton oil, or the officinal blistering liquid (liquor epispasticus); and especially by the inhalation of atomized fluids containing alum, or tannic acid, or turpentine, or creasote (F. 262). And lastly, to keeping the bronchiectases as empty as possible, so as to prevent the decomposition of the secretions; which is to be effected by such expectorants as squill or ipecacuanha, and the use of creasote vapor.

XII. HAY ASTHMA.

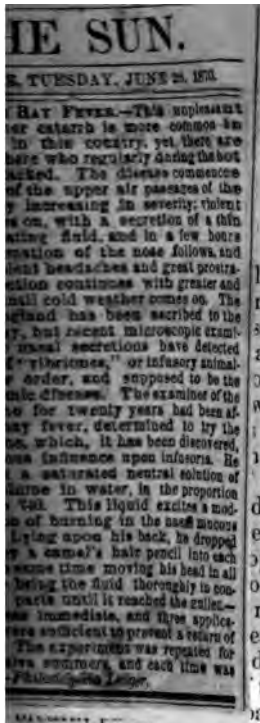
This peculiar disease (commonly known as *hay asthma*, *hay fever*, or *summer catarrh*) may perhaps be best described as a severe catarrh frequently having asthmatic symptoms superadded. The conjunctival, nasal, faucial, and bronchial mucous membranes are each affected; so that the patient has all the suffering often experienced from an aggravated common cold. There is headache, which is often severe; together with suffusion of the

eyes, sneezing, irritation of the nose and fauces, and a dry harassing c
Then at intervals there will be experienced paroxysmal attacks of m
lasting for two or three hours; the dyspnœa being sometimes so
that the patient has the most distressing sensations of impending
tion.

Hay asthma is not a very common disorder. It probably arise
the inhalation of the pungent aroma of spring grass and hay (*Ant
thum odoratum*); or from the perfume of the *Nardus stricta* when in
a grass which is abundant in many grazing fields, for cattle will not
Exposure to the emanations of *ipecacuanha powder* will produce it
pressible individuals. Dr. Pirrie says that a disorder analogous t
asthma prevails in some parts of the United States where the rose is l
cultivated, and that it is known by the name of *rose fever* or *rose c*
This gentleman also believes that hay fever is seldom, if ever, due
same noxious agents which are always the causes of hay asthma.
whereas the latter is the consequence of the action of the powder of
ing grasses or other vegetable irritants; the former is to be attri
more or less directly, to exposure to an excess of solar heat, aided in
instances by intensity of light. Commenting on the histories of wh
therefore proposes to call "summer fever" instead of "hay fever."
Pirrie attempts to prove the correctness of his views by asking for atte
to the condition under which some attacks originally supervene; th
persistence after removal from the sphere of supposed contraction; the
evident increase and decrease of the symptoms with a rise and fall of tem-
perature; the manifest and oft-expressed aggravation of general as well as
local suffering after exposure to strong light, or to a burning sun; the
strong likeness of many of the features of the popularly termed hay fever
to those constituting some of the after-effects of grave disorders commonly
ascribed to solar heat or high temperature; and the induction of a like
train of phenomena in some persons by heated air where no vegetation
exists. Whether the mischievous effects of great heat and intensity of
light are favored by any unusual telluric or atmospheric conditions, as by
an unusual amount of ozone, is uncertain. Dr. Pirrie seems, however, to
think that the electricity of the atmosphere and the sun's rays may have
some influence in the induction and maintenance of the disorder.

Supposing that an ordinary case of hay asthma be allowed to run its
course without medical treatment, it will probably have a duration of three
or four weeks. The disorder may, however, usually be cut short by re-
moval from the cause; a visit to the seaside is often effectual. In some
instances the susceptibility to the disease has been destroyed by the use of
quinine and iron, or of arsenic, or of nux vomica; in combination with
such hygienic management as is calculated to give tone to the nervous
system. During the attack, relief can be obtained from antispasmodics
like the tincture of lobelia (F. 88); ammonia and sumbul, or valerian, and
assafœtida (F. 86, 87, 95); belladonna, ether, and iodide of potassium (F.
31); Indian hemp and ether (F. 337); or from stramonium, conium, opium,
camphor, colchium in gouty subjects, &c. A trial of creasote inhalations
(F. 260) once or twice daily, as recommended by Dr. Walshe, may be
resorted to. The inhalation of steam medicated with carbolic acid, or with
turpentine, might do good. An anæsthetic composed of equal parts of pure
chloroform and ether may be employed for moderating the asthmatic par-
oxysm. For this purpose too, few agents are more valuable than tobacco;
inasmuch as directly the nausea and collapse caused by smoking set in,
the sense of suffocation will pass off and the patient be enabled to forget
his sufferings in sleep.

XIII. INFLUENZA.


IE SUN.

TUESDAY, JUNE 25, 1872.

HAY FEVER.—This unpleasant
er catarrh is more common in
in this country, yet there are
here who regularly during the hot
ason. The disease commences
of the upper air passages of the
by increasing in severity; violent
on, with a secretion of a thin
ating fluid, and in a few hours
ration of the nose follows, and
ent headaches and great prostra-
tion continues with greater and
until cold weather comes on. The
gland has been ascribed to the
r, but recent microscopic exami-
nasal secretions have detected
"vibriones," or infusory animal-
order, and supposed to be the
sole disease. The examiner of the
e for twenty years had been af-
ay fever, determined to try the
ch, which, it has been discovered,
ous influence upon infusoria. He
a saturated neutral solution of
drine in water, in the proportion
t. This liquid excites a mod-
e of burning in the nasal mucous
Lying upon his back, he dropped
a camel's hair pencil into each
same time moving his head in all
, letting the fluid thoroughly to com-
parts until it reached the gullet—
ost immediate, and three applica-
were sufficient to prevent a return of
The experiment was repeated for
ral summers, and each time was
Philadelphia Ledger.

Italian, *Influénza;* because the phenomena were the influence of the stars], or epidemic catarrhal la grippe," is an epidemic disorder attended with ness, running from the eyes and nose, frontal head- ss, and fever.

arious periods from some peculiar condition or con- osphere. The first visitation of it in this country, of worthy description, was that of 1510. The poisonous nature may be, wings its way with greater celerity an intercourse, while its progress seemed uninflu- the year; it is said to travel from east to west, and district more than six or seven weeks. Some visita- e severe than others; one in 1782, which extended ope, was very fatal. Dr. Southward Smith said that oke out in London in 1847, it spread in a single day metropolis, and affected upwards of 500,000 persons. ef symptoms presented by this somewhat mysterious dryness of the skin, urgent frontal headache, coryza, the fauces, hoarseness, harassing cough, shortness of ack and limbs, perverted taste, and disorders of the stomach. There are, in addition, all the signs of nervous and muscular prostration, such as an uncommon degree of languor and debility and dejection of spirits. Occasionally the danger is much increased by the setting in of acute bronchitis, capillary inflammation, or even of pneumonia. The suddenness and rapidity with which the fever occurs are very remarkable. This disease is more fatal to elderly than to other persons. In favorable cases it runs its course in rather less than a week; often terminating in an attack of diarrhœa, or in profuse sweating or diuresis, and merely leaving great feebleness.

Diagnosis.—Influenza differs from a common cold in its greater severity, and especially in the amount of prostration to which it gives rise. Between the reception of the poison and the commencement of the symptoms, there is a period of incubation; but as to the duration of this we know nothing, since in some well-observed cases it has appeared to be only ten or twelve hours, while in other instances it has been as many days. The *prognosis* is favorable as a general rule. The deaths amongst persons under forty years of age were very small indeed, in all the epidemics; but frequently amongst the aged, the mortality has been large.

Treatment.—About the treatment there can be no mistake. The patient had better be kept in bed, and barley-water with nourishing broths must be administered. In mild cases no drugs are needed. If the catarrhal symptoms become urgent, ten grains of the compound ipecacuanha powder may be given at night; or a mixture should be ordered containing Indian sarsaparilla with infusion of linseed (F. 241), or one of spirit of ether and senega and camphorated tincture of opium (F. 235). A sinapism applied to the chest, together with the inhalation of the steam of hot water, may be necessary. A vapor or hot-air bath would in many instances give great relief. When prostration is the predominant symptom, stimulants are to be freely resorted to; such as wine, ammonia, or even brandy. Milk and raw eggs help to give strength. The subsequent debility will be most quickly removed by tonics—especially by bark and phosphoric acid (F. 376), or quinine and iron (F. 380). Great good always accrues from a few days' holiday in the country.

XIV. HOOPING-COUGH.

Pertussis [from *Per* = very + *tussis* = a cough], or hooping-cough, is an infectious disease; rarely occurring more than once in the same individual; attended with more or less fever and vomiting; and accompanied at first by catarrh, and subsequently by a peculiar hard and convulsive cough which occurs in paroxysms at uncertain intervals. Its duration varies from three or four weeks to as many months. It is especially a disease of childhood.

Pathology.—Hooping-cough appears to depend upon some peculiar poison communicated through the atmosphere, which affects and irritates the pneumogastric or vagus nerve. The disease is now and then epidemic.

The bronchial glands are occasionally found enlarged after death. In many cases, also, structural changes have been detected in the air-passages, or in some portion of the alimentary canal. Collapse of one or more of the lobes of the lungs seems to be a frequent cause of death. A general dilatation of the bronchi has now and then been found; the finer tubes being usually most affected, because their structure is entirely membranous without any plates of cartilage to strengthen them. This dilatation probably results from the violent inspiratory efforts which cause the hoop. Sir George Duncan Gibb has pointed out that in many cases the urine is saccharine (*pertussal glucosuria*), the quantity of sugar being usually small, and often consisting of a mere trace.

Symptoms.—At the commencement (after a latent period of perhaps six days) the poison produces a simple febrile stage of eight, ten, or twenty days' duration; this stage being sometimes accompanied, but generally followed, by severe attacks of coughing. The little child is seldom confined to his bed, though he is restless from the coryza, oppression of the chest, and heat of the skin. When the fever begins to remit, at about the end of ten days, the cough changes its character, becoming convulsive and prolonged, assuming its peculiar shrill sound or hoop, and being followed by expectoration or vomiting of ropy mucus. As the severity of the cough increases the paroxysms assume a suffocative character, which terrify the patient. The vessels of the head, neck, and face, become congested and swollen during each attack; the eyes appear as if starting from their sockets; the nose may bleed, and frequently the contents of the bladder and rectum are discharged involuntarily. Prior to the commencement of each fit the sufferer has a kind of warning, and he runs to his nurse for protection. The series of coughs or expiratory efforts are so powerful, and expel the air so largely from the lungs, that the patient seems on the point of being suffocated; until a long-protracted inspiratory act follows, the rush of air through the contracted glottis causing the characteristic crowing or hooping noise. As Dr. Todd was in the habit of teaching, this is the signal of the child's safety. Directly the fit, which bears some analogy to laryngismus stridulus, is over, the child regains his courage, soon appears well, and returns to his amusements, while even if it end in an attack of vomiting, there is a craving for food immediately afterwards, and he asks for something to eat. Where the fits of coughing are very severe they are occasionally followed by hemorrhage from the mouth as well as from the nose, while sometimes there is even bleeding from the ears. In this latter case, rupture of the membrane of the tympanum has happened, deafness resulting in the affected ear unless the laceration completely heals. Ecchymosis of the conjunctivæ, from the giving way of one or more small subconjunctival vessels, is far from a rare occurrence. The frequency with which

ıe paroxysms of cough recur varies: there may be only two or three in ne day, or as many in an hour. The cough is usually most severe at ight, and the first manifestation of improvement is a decrease in these octurnal exacerbations. Then the paroxysms become altogether less evere as well as less frequent, until at the end of an uncertain time no ymptom remains of the disease. Under the influence of exposure to cold, r of improper food, however, the cough may return with all its former iolence, so that for several weeks after apparent recovery great care will e needed.

The duration of hooping-cough is very variable, some cases being susceptible of cure in a fortnight or three weeks, while others continue troublesome for several months. When the disease comes on in the autumnal or winter quarters, I believe it to be more obstinate than when it sets in during the spring or summer.

Complications.—Hooping-cough does not always run its course in the comparatively simple manner just described. Sometimes it supervenes upon other disease. Thus, it may come on during convalescence from measles, and not only give rise by itself to dangerous symptoms, but very likely become complicated with bronchitis or pneumonia, or with some cerebral affection. These complications may occur in any case, and inasmuch as they are very troublesome and not unfrequently dangerous, they demand a brief notice.

(1.) Hooping-cough, *complicated with bronchitis or pneumonia*, is met with most frequently during the cold months of winter or spring. Unless the inflammation is severe, it will only be noticed in the commencement that the child is feverish and that the breathing is accelerated in the intervals between the paroxysms of cough; that the expectoration is opaque and glairy, and that the cough is less constantly followed by vomiting than in simple pertussis. But as the morbid action progresses the constitutional disturbance becomes great, the respiration difficult and quick, the pulse frequent, the fever burning, and the general signs of bronchitis or of pneumonia get fully developed; while if auscultation be practiced the diagnosis will not be difficult, with one exception. We are indebted to Dr. Alderson, and subsequently to Dr. Graily Hewitt, for distinctly pointing out that when hooping-cough proves fatal it generally does so not by giving rise to pneumonia as has been thought, but by inducing catarrhal inflammation of the bronchial tubes, attended with collapse of a portion of the lungs. This airless state of a part of the lung has also been found in young children from other causes besides hooping-cough, as well as in adults, as has been already mentioned in the remarks on bronchitis (see Sections X and XVII of this Part.) Pulmonary collapse, however, is not by any means necessarily fatal unless it prove extensive, or be badly treated by lowering measures: it is a condition which especially calls for the free employment of stimulating expectorants, wine, and as strong liquid nourishment as can be digested.

(2.) Hooping-cough *associated with convulsions, congestion of the brain, or with hydrocephalus*, is not uncommon, especially in infants about the period of dentition. In these, convulsions of various forms, spasm of the glottis, screaming, &c., are of frequent occurrence, and are indicative of cerebral irritation. Congestion of the brain, owing to the return of the blood from this organ being interrupted during the paroxysms of cough, may be very slight and temporary, or excessive: in the latter case it will perhaps lead to inflammation of the membranes, or to the effusion of serum into the ventricles, or even to softening of some of the central parts. "In all cases of pertussis," says Dr. Copland, "when chills, followed by burning heat of

the surface; pains of the head, with obscure redness of the conjunctiva; a fixed, brilliant, dry, and peculiar appearance of the eye; unusual redness or pallor of the face; very torpid bowels with morbid excretions; irritability of stomach independently of the fits of cough; aversion from light or noise; heaviness or drowsiness and languor; grinding of the teeth, or sudden starting or shocks of the body in sleep; rolling or tossing back the head and piercing screams are observed: then irritation of the brain or its membranes, which will soon pass into organic change and effusion, is manifestly present, whether there be convulsions or not. When stupor or unconsciousness has come on, with one arm waving in the air, or tossed over the head, whilst the other is paralyzed, a farther advanced state of disease than merely inflammatory irritation, or softening or effusion, may be inferred."*

(3.) Hooping-cough *may be complicated with disordered conditions of the bowels*—as indicated by a loaded tongue, foul breath, loss of appetite, a tumid abdomen, and offensive unnatural evacuations. If these symptoms continue for some time unrelieved, the chronic irritation of the digestive mucous surface gives rise to a remittent febrile disorder, in which the attacks of cough become more frequent, the breathing gets oppressed and hurried, the child's aspect becomes peculiar, and it is constantly picking its nose and lips. There is also increasing emaciation, and febrile exacerbations and remissions are observed twice in the twenty-four hours. Should the disorder proceed further still, serous effusion into the ventricles of the brain may take place, or disease of the mesenteric glands will be very likely to result.

Diagnosis.—This can only be at all difficult when (as is sometimes the case) the characteristic hoop is wanting. Even then the paroxysmal nature of the cough, the tendency to transitory attacks of retching, the character of the expectoration, the intervals of complete relief, and the evidence of a tendency to cerebral congestion during the convulsive attacks, will serve to mark the affection.

Prognosis.—In simple cases a favorable opinion may always be given, unless the cough be very violent, the intervals of relief short and imperfect, the breathing hurried, the rest at night much disturbed, and the appetite very bad. With regard to the different complications, it should be remembered that they often make their approach very insidiously; that they are the more to be feared the younger the child; that they are especially dangerous at the period of dentition; and that they are more alarming in such children as have strumous or consumptive parents. Moreover, pulmonary complications are very apt to ensue when hooping-cough occurs during convalescence from measles or scarlatina. And then, finally, all kinds of cerebral symptoms, severe nocturnal exacerbations, fever and dyspnœa during the intervals, and difficult and scanty expectoration after the fits of coughing, are signs of danger. The mortality of hooping-cough is larger in female than in male children; and the colder the season of the year, the greater the fatality. During 1866, the deaths in England from this disease were 15,764; of which number $\frac{\text{Males } 6893}{\text{Females } 8345} = 15{,}238$ were children under 5 years of age.

Treatment.—To describe all the remedies that have been proposed for the cure of this affection, either by orthodox physicians or dangerous amateurs, would occupy several pages; but as the majority of the "specifics" are worthless, such a labor is unnecessary.

The object of our treatment must be to keep the disease simple, to prevent

* A Dictionary of Practical Medicine. Article "Hooping-Cough," vol. ii, p. 239. London, 1858.

other affections from complicating it; for since it arises from a particular contagion, as small-pox and scarlet fever do, so it has a tendency to run a certain course uncontrolled by art. In mild cases very little management is required. The patient should be warmly clothed, kept indoors, fed with light nourishing food, and allowed to drink freely of some sweetened mucilaginous fluid. No medicine need be administered internally; but the spine may be rubbed every night with belladonna and soap liniment in the proportion of two drachms to twenty-two, or with a mixture of equal parts of tincture of belladonna, glycerin, and camphor liniment.

With regard to the more severe forms of the disease, emetics (F. 231) are often very beneficial, especially if their use be followed by mild sedative expectorants, such as the tincture of squills and camphorated tincture of opium; or by a mixture of ammonia and ipecacuanha and senega (F. 235). As in all diseases, bloodletting has been recommended by some physicians. But I think it is impossible not to see that this affection, instead of being an inflammatory, is rather a spasmodic complaint; and, consequently, on this ground alone it may be positively asserted that antiphlogistic measures can wisely be discarded. The patient must be kept from cold air, in an apartment having a temperature of about 65° or 68° Fahr.; he ought to be clothed in flannel; while the general nutrition should be maintained by food easily to be assimilated, such as fish, milk, light suet puddings, and new-laid eggs. The chest can be sponged, back and front, once or twice a day, with cold salt water; and embrocations containing sedatives may be afterwards used to the same part. The best drugs are those known as tonics and antispasmodics—such as some salt of zinc, bark, quinine, morphia, aconite, belladonna, conium, hydrocyanic acid, assafœtida, camphor, spirit of ether, and chloroform. It need hardly be mentioned that the greatest caution will be necessary in the use of most of these remedies, that they should be given in minute doses, and that their effects ought to be narrowly watched. A favorite practice with me is to order the sulphate of zinc, in gradually increasing doses, thrice daily; to give a mixture of ammonia, ether (or spirit of chloroform), morphia, and hydrocyanic acid, which shall be administered occasionally, as the frequency of the paroxysms may demand; and to have the spine well rubbed, night and morning, with an embrocation made of two parts of belladonna linament, two of chloroform liniment, and twenty of camphor or soap liniment.

Dr. Fuller speaks very highly of the use of sulphate of zinc and belladonna (F. 92); under the influence of which remedies, given in increasing and large doses, he says the hoop rarely lasts more than twenty-one days, while it sometimes subsides in ten. In out-patient hospital practice I was generally disappointed with this treatment; but there are many reasons why too much reliance should not be placed upon results thus obtained.

Sir G. D. Gibb states that nitric acid (F. 91) is a specific. This remedy was first recommended by Dr. Arnold, of Montreal, several years ago. There are other practioners who also think highly of it; but as they rarely seem to trust it alone, the value to be attached to their opinions cannot be easily estimated. Certainly, in my hands nitric acid has not acted in any degree to the favorable extent that was expected from all that had been urged in its favor. Dr. George Harley has found the bromide of ammonium useful, possibly owing to its peculiar anæsthetic effect upon the nerves of the larynx and pharynx. The dose is from two grains thrice daily for an infant, up to twelve grains for older children. In many instances great benefit will be produced by sponging the fauces and glottis with a solution of nitrate of silver (twenty grains to the ounce of distilled water). Where the secretion from the bronchial tubes is excessive, it should be checked by

astringents; as, for example, by alum, sulphate of zinc, small doses of sulphuric acid and infusion of bark, or gallic acid. When there is much debility the solution of raw beef (F. 2), aided with good milk, small quantities of brandy, and perhaps a few drops of tincture of cinchona, will prove most serviceable. And lastly, supposing the case becomes chronic, a cure may be effected by ferruginous tonics, cod-liver oil, and change of air, particularly by removal to the seaside.

XV. ASTHMA.

Asthma [from *Ἀσθμάζω* = to gasp for breath] should be defined as essentially a nervous disease; the phenomena which it presents being dependent upon tonic contraction of the circular muscular fibres of the bronchial tubes. The paroxysms can be induced by direct or reflex mechanism,—or in other words, the stimulus to contraction may be central, in the medulla oblongata; or it will be in the pulmonary or gastric portion of the pneumogastric, or in some other portion of the nervous system besides the vagus, and being transmitted to the medulla oblongata by incident, may be thence reflected by motor filaments.

Symptoms.—A fit of asthma is either preceded by headache and sleepiness, or by various digestive or other disturbances, or it occurs suddenly without any warning. The patient awakes two or three hours after midnight with a sensation of suffocation or constriction about the chest; the dyspnœa gradually increasing until a fearful and most painful struggle for breath sets in. Various postures are assumed to facilitate the attempts at emptying and filling the lungs: the patient stands erect, or leans his head forwards on his hands on some piece of furniture, or holds himself up at the open window where he will remain almost for hours gasping for air. The chest is distended to its utmost limit, inspiration and expiration are performed with the greatest difficulty, and there is evidently some serious obstruction to the entrance and exit of air. If we auscult the thorax no normal respiratory murmur is audible; but we hear sibilant rhonchi, loud wheezing, or shrill whistlings. For inasmuch as the varying calibre of the tubes, due to the muscular contraction, causes the air in them to be thrown into vibrations, so we of course have musical sounds of greater or less intensity according to the size of the constricted bronchi. The pulse is small and feeble; the eyes are staring; and the countenance is anxious. The skin gets cold (the temperature often falling to 82° Fahr.) and clammy from deficient oxygenation, while it may subsequently become bathed in a hot sweat owing to the fatigue produced by the respiratory efforts. The patient's whole appearance is most distressing, so much so that he seems to bystanders who are unacquainted with the character of his disease to be dying; while he is either irritable at his prolonged suffering, or he looks beseechingly at the attendant for relief from his intense misery. Then, after a certain lapse of time, varying from two or three to thirty-six or even more hours, comes a remission. Cough ensues, and with the cough expectoration of little pellets of mucus; and soon the paroxysm ceases, to allow the sufferer to fall into the long-desired sleep.

When the attack has been prolonged, the intercostal muscles, as well as all those brought into play by the act of respiration, ache continuously for two or three days after the fit has ceased. The patient commonly says that

e feels sore all over. There is indeed genuine myalgia, produced by the normous exertion which has been made to lessen the distress occasioned by ne urgent dyspnœa.

Dr. Sidney Ringer has examined the urine in one case of spasmodic sthma. He found a remarkable diminution of the urea and the chloride f sodium, in the hours immediately succeeding the attack. There was, nerefore, either a considerable arrest of formation or of elimination; most robably of the former. After four hours the urea rose to its former mount; while the chloride of sodium was increased beyond it.*

During the interval which elapses between one asthmatic paroxysm and he next, the patient very often enjoys moderately good health, and has his reathing quiet and free. Most asthmatics, however, are thin and characeristically round shouldered; they have an anxious appearance of counenance, the cheeks are hollow, and the voice is rather hoarse; while there s habitually a slight cough. The length of the interval varies greatly in lifferent cases; but not unfrequently the attacks are periodic, whether the ime of recurrence be once in twenty-four hours, or once a week, or once a nonth, or once in twelve months. In one of the most troublesome cases though there was no organic disease) which have come under my notice, he paroxysm always came on every morning at 1 o'clock; the dyspnœa ontinuing just as regularly for two hours. Thinking that this periodicity night be due to some particular stage in the function of digestion, the patient was advised to discontinue taking supper, but no alteration was induced in the disease. In a second remarkable instance, a fit of asthma can always be produced by a dose of opium in any form or quantity; a drug which unfortunately often seems demanded by other severe symptoms due to intestinal disease. On two or three occasions also the asthmatic attack has merged into one of catalepsy; this state lasting for a few hours. Then again, with another asthmatic, habit has something to do with the attacks. Thus, he is generally well in London, yet being fond of Brighton tries to stay there some weeks in each year. But if, on the first night of sleeping away from town he experience an attack, a paroxysm is sure to recur nightly, until he is compelled to return; whereas if this night be safely passed over, he may continue his seaside residence for weeks without any fear. As a rule, according to my experience, the bracing air of Brighton and similar localities is seldom favorable to asthmatics. They, indeed, are often much more comfortable in districts which are less healthy—particularly at night. A professional friend instead of adopting the common plan of getting a partial holiday for a few weeks by sleeping out of town, reverses the practice; inasmuch as he leaves London in the morning to spend his day in the country, returning home every evening to his bed. Dr. Salter† mentions somewhat similar cases; while this gentleman also points out the capriciousness of asthma, one patient being better in a crowded city than in the country, another being benefited by a bracing air and injured by a relaxing climate, a third preferring the winter months to the autumnal, while again there are other instances where it is just the reverse of all this.

Asthma is more common in men than in women; it is often hereditary; and it sets in at any time of life, though most frequently about the middle period. It may be uncomplicated, that is to say, in all other respects the sufferer is perfectly healthy, there being no lesion of the brain, lungs, heart, stomach, or other organs; or it may be complicated with, or indeed symp-

* The Composition of the Urine, in Health and Disease, and under the Action of Remedies. By Edmund A. Parkes, M.D., &c., p. 319. London, 1860.

† On Asthma: its Pathology and Treatment, pp. 230-261. London, 1860.

tomatic of, some disorder like chronic bronchitis, heart disease, ovarian or uterine disorder, a morbid state of the nervous system, &c. The first form is sometimes known as *idiopathic* or *spasmodic*, the second as *symptomatic* or *organic* asthma.

Causes.—The fact that the tendency to asthma may be hereditary has just been mentioned; but it must be remembered that often no influence of this kind can be discovered. Again, this affection will sometimes be owing to some organic disease within the chest, while frequently no such cause can be detected.

The paroxysm may be directly due to an irritant inspired into the air-passages, such as dust, cold air, certain vapors, and emanations from hay, or ipecacuanha, or mustard. Any preparation of opium will provoke an attack in certain constitutions. The influence of particular atmospheric or climatic conditions is well known; though we are unable to explain why one asthmatic should be unable to sleep in a smoky and dirty city, while another can live nowhere else. Improper food, or an excessive quantity, or meals taken at certain particular times (*e. g.*, late suppers), may originate a fit. Sausages, kidneys, pork, cold boiled beef and pickles, toasted cheese and porter, &c., freely partaken of at night, have had the credit in cases which I have seen of starting off the attack. So again, the cause may be some irritation applied to parts of the body remote from the chest; as was observed in a patient of Dr. Chowne's, where the application of cold to the instep at once induced the fit. And lastly, mental emotion—fear, disappointment, anger, &c., may originate it.

I have very little doubt, moreover, that a tendency to asthmatic paroxysms may be kept up by skin diseases, as well as by affections of the stomach and intestines; though I am not as certain about these disorders acting as causes in the first instance. It has seemed to me that asthmatics are unusually liable to cutaneous eruptions.

Prognosis.—Spasmodic asthma very rarely, if ever, directly destroys life: and even many who are subject to it live to a good old age, perhaps for the reason that they are obliged to take great care of themselves. Moreover, a complete cure occasionally takes place; though, as a rule, when an attack has once occurred, the chances are in favor of there being many repetitions of it.

The disease is nevertheless a very serious one; partly because of the distress it entails, though chiefly in consequence of the morbid pulmonary and cardiac conditions which it sometimes induces. The principal of these are congestion of the lungs, emphysema, and hypertrophy with dilatation of the right side of the heart; which conditions mostly arise in consequence of the repeated obstruction to the circulation of the blood through the pulmonary capillaries, impeding the action of the right side of the heart. When either of these complications has become thoroughly established, the asthmatic passes but a poor time with it. Indeed, his life is gradually rendered more and more miserable by cough, abundant expectoration, orthopnœa, venous regurgitation, œdema, and cyanosis; until at length, after a long period of ill-health, the circulation of venous blood produces somnolence and coma, which are soon followed by a welcome death.

Treatment.—Under this head must be considered the measures necessary to relieve the paroxysm, and those which should be employed in the hope of preventing or delaying its recurrence.

(1.) *During the paroxysm* we first have to try to remove the exciting cause; as by giving an emetic when the stomach contains an undigested meal, or administering an enema if a loaded rectum seem to be the source of the irritation. Then our efforts ought to be directed towards relaxing

the bronchial spasm, and for this purpose we resort to the use of sedatives. Frequently I have found that the latter object has been admirably fulfilled by a large dose of *iodide of potassium* (ten or even twenty grains), combined with some aromatic spirit of ammonia and spirit of ether and tincture of belladonna. *Tobacco* may be employed as a depressant or as a sedative, and in either way it often effects good. To those who are unaccustomed to smoking, a pipe of Latakia (which is quite strong enough for the purpose) soon produces exhaustion; while directly the feeling of nausea and collapse comes on, the attack of asthma ceases. As a sedative, tobacco is more uncertain, though it will perhaps prove useful if taken when a fit seems impending. *Chloroform* is invaluable in many instances, while in others it does harm; and such is also the case with the vapor of *ether* (F. 313). The latter possesses this advantage, that with the proper directions it may be intrusted to the patient's wife or nurse for administration, after it has been found to have a favorable effect. Moreover, it rarely nauseates patients so much as the prolonged use of chloroform frequently does; while to many it is, from the first, more agreeable. It will seldom be necessary to produce complete insensibility, and when there is any blueness of the surface it can never be advisable to do so. The inhalation of a mixture of equal parts of chloroform and ether is not only attended with less depression than when chloroform simply is used, and with less excitement than when pure ether is employed, but it has also seemed to be useful where neither agent alone has answered. While the patient is under the influence of the anæsthetic I have used, with great advantage, subcutaneous injections of atropin, or of morphia, or of a combination of both (F. 314); of course avoiding the morphia where the use of opium is known to have the effect of causing an attack. *Stramonium*, or Thornapple, acts like a charm with certain asthmatics, a few whiffs of a pipe filled with it, or of a cigar, giving relief; but, in other cases it is quite worthless. Care must be taken to get the drug good, while it may be remembered that the seeds are much more powerful than the leaves and stalk cut up. The fumes of the *Datura Tatula*, obtained by smoking cigars made of this plant, act in a similar way to those of the Datura Stramonium. The *Cigares Anti-Asthmatiques de Mr. Joy*, are occasionally very efficacious. I do not know their composition; but imagine they may be made of bibulous paper soaked in an arsenical solution of nitrate of potash flavored with tobacco. *Nitre-paper fumes* (the fumes of burning filtering- or blotting-paper which has been soaked in a saturated solution of nitrate of potash and dried) affords much alleviation in many cases of uncomplicated asthma. And lastly, there are instances where palliation is soonest obtained from a *stimulant*, as a glass of whisky or brandy toddy, or a cup of very strong coffee. I am told that the poor of Perth often stop an attack with a noggin of whisky; but a paroxysm thus starts off the propensity to drink, which is sometimes only checked when the sufferer has pawned all that he possesses.

(2.) Our *treatment in the interval* ought to be directed to improving the general health by prescribing tonics, a regular mode of life, and the use of the cold shower or sponge bath; to laying down rules as to diet, so as to obviate attacks of dyspepsia; to so ordering the times of the various meals that the process of digestion may be finished before bedtime; and to choosing a climate the opposite to that in which the fits come on—as London air for those who are worst in the country, and the reverse.

Where there is a relaxed condition of the mucous membrane about the fauces, and the expectoration is copious, *tannin* or *catechu lozenges* prove useful. When the digestion is weak, benefit will often be derived from the *nitro-hydrochloric acid* (F. 378) with *pepsin* (F. 420) at the meals. In many

instances, where the cause is obscure, the *iodide of potassium* (F. 31) certainly works wonders. While the fourth edition of this work was in the press I was trying this remedy, but had not then had sufficient experience to justify my recommending it. Since then it has seemed to effect a complete cure in several well-marked cases, while it has proved beneficial in many others; so that I am inclined to think there is no single remedy which can compete with it. This drug requires to be persevered with for some weeks; the patient being watched, lest it impoverish the blood and produce purpura, or boils, or even a carbuncle. Directly any hemorrhagic spots appear, however, all may be made to go well by temporarily substituting quinine, or nitric acid and bark. *Arsenic* is another medicine which at times seems to exert a favorable influence. The peasants of Styria and Hungary who eat this metal find that it strengthens their lungs, or they say it does so. When an extremely clever gentleman buys a showy cob at a horse fair, upon his own responsibility, he not unfrequently finds himself possessed of "a shotten piper," a broken-winded animal whose failing has been concealed by a generous dose of shot and tallow. The "coper," who has gone off quietly at the conclusion of the bargain, has probably administered the remedy, on the mechanical principle that it will prevent "a rising of the lights;" but scientific witnesses affirm that the arsenic in the shot is the effective agent, this medicine being good for the wind of horses, greyhounds, and sporting dogs. Whether on this view, arsenic is likely to be serviceable in asthma is deserving of consideration. As far as my own experience goes, I can only say that in cases where patients have simultaneously suffered from lepra and asthma, arsenic has done great good. But whether the benefit has been owing to the remedy itself, or has only arisen secondarily from the cure of the skin disease, must at present remain a matter of doubt. Dr. Beigel, however, remarks that the inhalation of spray medicated with from five to ten minims of the arsenical solution (F. 262), has rapidly succeeded in curing inveterate cases of asthma after the failure of other remedies.

In conclusion, if there be constipation during any plan of treatment, a mild aperient should be given at bedtime, such as five grains of compound rhubarb pill with the same quantity of extract of conium. The inhalation of oxygen gas might (as suggested by Dr. Goolden and others) do [redacted]ances; or the peroxide of hydrogen (F. 370) would per[redacted]mporary ease; or possibly the respiration of compressed air (long since recommended by Sir John Sinclair and others) would give relief in similar cases, by affording the system an excess of oxygen. Without condemning these remedies I am bound to confess, however, that disappointment has been the usual result of my trying them. As regards blisters to the spine and nucha, galvanism, issues, the administration of strychnia, &c., it need only be said that the obvious theoretical objections to these agents have not been overcome, so far as I know, by any practical experience of their utility; although they are not unfrequently recommended.

XVI. EMPHYSEMA.

The diseases of the lung thus denominated are of two kinds. One consists essentially of enlargement of the air-cells, atrophy of their walls, and obliteration of their vessels; this is called *vesicular* or *pulmonary* emphysema [*Ἐμφυσάω* = to inflate]. When, on the other hand, there is

infiltration of the air into the interlobular connective tissue, or into the subpleural connective tissue, the disease is known as *interlobular* emphysema. Both forms give rise to habitual shortness of breath, with occasional severe paroxysms of asthma; in many instances they lead to disease of the right cavities of the heart, with venous congestion and dropsy; while they are at all times very distressing complaints, and quite unfit the sufferer for any active occupation.

Vesicular emphysema may affect one lung, or both, or only a part of each—especially the anterior edges and the apices. The increase in the size of the air-cells necessarily diminishes the contractility of the yellow elastic fibrous tissue of their walls; which tissue, on being long overstretched, is unable to recover its tone. Then the walls become perforated, small oval openings resulting; the perforations gradually increasing in size. As the disease progresses there is a complete wasting of the partitions between the sacs; so that two or three or more form one cavity, which may project from the surface of lung like a bladder. The dilated air-vesicles, in partial emphysema, are not found in those parts of the lung where there is evidence of pre-existing bronchitis, but in the opposite portions.

According to Professor Gairdner,* vesicular emphysema is of mechanical origin, is produced by the inspiration force, and is essentially a compensatory dilatation of the air-cells, implying that a portion of the lung is non-expansible; hence the foundation of the disease may be bronchitis, pulmonary collapse, asthma, &c. Some discussion has since arisen as to whether the extra strain upon the cells really occurs from the pressure of the air during inspiration or expiration; and it seems probable that although a certain amount of dilatation may be determined by inspiration, yet—as Sir William Jenner† has shown—the most efficient cause is the pressure of the air contained in the lung brought to bear upon the inner surface of the air-cells by the expiratory efforts.

Dr. Waters recognizes and defines three forms of pulmonary vesicular emphysema.‡ The first, or *partial lobular emphysema*, exists usually with the second form, and consists of small patches of dilated air-sacs especially along the margins of the lobes. These patches involved a few air-sacs only; they elevate the pleura, and they are sometimes found along the margin of the base of the lung looking like a row of beads. The second form, or *lobular emphysema*, is the most common. It involves one or more lobules in different parts of the lung; but is particularly seen at the margin of the base, at the anterior border, and at the apex. This kind is often met with in phthisis, and in those disorders of the respiratory organs which are accompanied by violent cough. The third form, or *lobar emphysema*, is by far the most formidable; often destroying life at an early period. There is an emphysematous condition of the whole pulmonary tissue of a lobe, or of one lung, or of both lungs. The dilatation of the air-cells comes on insidiously, but progresses steadily; while as the distension increases the walls of the cells get thinner and thinner, until they become perforated and broken down. This disease is constitutional—the result of some degenerative process, the exact nature of which is uncertain. Dr. Rainey and Dr. C. J. B. Williams have expressed the opinion that it is a fatty degeneration of the lung-tissue which brings

* British and Foreign Medico-Chirurgical Review, vol. xi, p. 469. London, 1853.
† Medico-Chirurgical Transactions, vol. xl, p. 25. London, 1857.
‡ On Diseases of the Chest, &c., p. 109. London and Liverpool, 1868.

about the atrophy and rupture of the cells; while Sir William Jenner regards the change as a fibrous degeneration—the consequence of an exudation of lymph from the capillaries, when they have been the seat of slight long-continued congestion. These conclusions are disputed by Dr. Waters; who admits the constitutional nature of the disease, but has not been able to trace the precise kind of degeneration. Still he believes that the most important feature in it is a malnutrition of the lung-tissue; and this is the point to be borne in mind, since it necessarily influences the question of treatment. Dr. Waters found his view on these facts,—the emphysema may reach a high degree of development without any previous history of long-standing cough; the disease is sometimes hereditary; the uniform manner in which the whole of both lungs is occasionally attacked; and the way in which the disease is influenced by those remedies that act beneficially in other cases attended with degeneration of tissue. These are certainly strong corroborative circumstances. It is further considered that the distension is not brought about by expiratory efforts, but by inspiration; the abnormally weak lung-tissue giving way under the influence of a pressure, which in a state of health it would be able to resist. Hence, the primary step in the disease is a degeneration of lung-tissue, and the mechanical distension a secondary consequence.

The prominent symptom of emphysema is dyspnœa, which is much increased upon any exertion, and is aggravated by cold and damp. There is also a feeble cough, difficult expectoration of frothy sputa, a dusky appearance of the countenance, weakness of the voice, a stooping gait, loss of flesh with strength, a lowered temperature of the body, constipation, a weak and slow pulse, a sense of oppression about the chest, and a diminished frequency of the respirations. The physical signs of this disease consist of unnatural clearness and resonance on percussion, while only a very indistinct vesicular murmur is heard on auscultation. Occasionally a moist râle will be detected, like the subcrepitant rattle of bronchitis. The heart's sounds are merely feebly audible, and this organ is often displaced, while, if only one lung be affected, there will be cardiac displacement to the opposite side, or if both be involved we shall have displacement downwards and to the right. The diseased side of the thorax is always more prominent and rounder than the healthy one. Thus, as regards percussion and auscultation, emphysema affords results the reverse of other affections, the disease consisting, as it were, of a superabundance of air which does not pass away, there is more resonance, but less sound in the air-passage—less respiratory murmur. It can only be confounded with pneumothorax, but it may be distinguished by remembering that this latter disease merely affects one side of the chest, that the percussion-note is much more tympanitic, and that the site over which the resonance is obtained is considerably more extensive than in emphysema.

The affections more frequently associated with emphysema than any others, are the following: *Asthma*, the most distressing seizures of which usually occur in the night, and which probably is due to irritation from pulmonary congestion setting up reflex paroxysmal contractions of the muscular fibres of the bronchi. In some cases asthma is the primary disease, producing the emphysema. *Bronchitis* often occurs where there is emphysema. The inflammation may cause death by the excessive secretion of muco-purulent fluid accumulating in the bronchi, and so leading to slow suffocation. Not uncommonly a fatal termination is due to the formation of fibrinous clots in the cavities of the heart, or in the commencement of the aorta or pulmonary artery. *Affections of the heart*, hypertrophy, with dilatation of the ventricles, being the most common.

With respect to the treatment we can, for the most part, only attempt to give relief by an invigorating diet, rest, warm clothing, and attention to the digestive organs, as well as by the occasional use of tonics and antispasmodics. Amongst the former drugs, quinine and iron are the most useful (F. 380); or, if the digestion be weak, steel and pepsin (F. 394) at the meals, may be preferable. Strychnia has failed to be of any service. Cod-liver oil ought also to be administered. Amongst the latter remedies, ammonia, ether, hydrocyanic acid, sumbul, &c. (F. 85, 86, 95), are the most promising. The ethereal tincture of lobelia has been recommended, and so has the Indian hemp. Stramonium may also be smoked, or the camphor cigarettes of M. Raspail can be tried. Sometimes I have seen a preparation of oxygen (F. 370) give relief. Occasionally the vapor of chloroform is of great temporary service.

A warm climate is often very beneficial to sufferers from this affection, the dyspnœa being always most urgent in cold weather. Mr. Jeffrey's pneumoclime (respirator) can generally be worn with advantage during unfavorable states of the atmosphere. If Sir William Jenner's theory be correct, we must, as he shows, moderate the violence of the expiratory actions in persons disposed to emphysema, and not allow them to follow toilsome occupations (such as carrying or pushing heavy weights) which necessitate expiratory efforts with a closed glottis.

The management of all the secondary affections requires to be conducted with caution, for, if lowering measures are employed, the patient's safety will be much jeopardized. In bronchitis more especially ammonia does much good, inasmuch as it aids the expectoration of the fluid which is apt to produce apnœa if allowed to accumulate in the air-tubes, while it also diminishes the chance of thrombosis. Nourishing food, milk, and moderate quantities of alcoholic stimulants, will also be needed.

Interlobular emphysema consists of an infiltration or collection of air in the connective tissue between the different lobules. It is generally produced by the sudden rupture of some air-cells in consequence of violent strain or effort. Hence it may be caused by forcing or bearing-down at stool, by the expulsive pains of parturition, by repeated fits of coughing, and so on. On examining several fatal cases of hooping-cough, M. Guillot found extensive subpleural emphysema; in a few instances emphysema of the areolar tissue of the mediastinum, and even of the neck, being also present.

This affection is not to be diagnosed by any certain signs during life. Every now and then it is associated with vesicular emphysema; it is frequently very limited; while when unusually extensive, it can at once give rise to fatal asphyxia.

XVII. CONDENSATION OF THE LUNG.

Condensation of the lung may result from pneumonia, from phthisis, from cancerous deposit, or from the exudation and infiltration of a syphilitic material into the pulmonary tissue; as well as from pressure exerted on the lung by fluid poured out in pleurisy, by enlarged bronchial glands, and by aneurismal or other intra-thoracic tumors. A small tube, or even a main bronchus, will thus become so obstructed that air cannot pass; and as a consequence there results collapse of that portion of the lung to which the compressed bronchus leads.

But in the present section the foregoing cases have not to be dealt with. We have now to consider that particular variety of pulmonary condensation which is owing to collapse of the air-cells from the plugging up (generally by a thick tenacious secretion) of a bronchial tube. This form has been variously designated as *disseminated lobular pneumonia*, or *marginal pneumonia*, or *carnification*, or *pulmonary collapse*. The same condition is sometimes met with in new-born infants, from congenital non-expansion of the air-cells, being known as *atelectasis* of the lungs. Hence it will be convenient to speak of these two sets of cases separately, under the heads of *acquired* and *congenital* pulmonary condensation.

In *acquired* pulmonary collapse, the margin of the lung, or an irregular portion of one lobe, or an entire lobe, or even the whole of the organ, is found involved. The obstruction may be owing to an increase in the secretion of the mucous membrane, with inability to cough it up; and therefore it not unfrequently occurs in bronchitis and hooping-cough, especially in feeble subjects. Or, the secretion being natural in quantity, is expelled with such great difficulty (owing to old age or general debility) that an accumulation takes place in the central or some other part of the lung, and then acts like a plug. In either case it can be readily understood that a portion of tenacious mucus at the bifurcation of a bronchus will play like a valve; at every expiration permitting of the escape of air, but falling close on the opening at each inspiration so as to prevent ingress. Consequently the vesicles beyond the obstruction gradually become emptied of air, and then collapse; this condition causing more or less severe dyspnœa, in proportion to the extent of lung affected. The physical signs of collapse ought to consist of decided dulness on percussion, with an absence of the respiratory murmur over the affected parts. Where, however, the morbid condition has been of some duration, the signs are apt to be masked by the occurrence of a kind of compensatory emphysematous distension of those portions of lung anterior to the obstruction.

The indications for treatment are sufficiently obvious. Instead of inflammation we have general debility with deficient inspiratory power. Hence stimulating expectorants (more particularly ipecacuanha and ammonia), tonics, and restorative food, are the remedies to be employed.

Congenital non-expansion of the air-cells is met with in weakly infants. Some portions of the lungs (especially the lower edge of the upper and lower lobes, and the middle lobe of the right lung) are liable to remain solid and unaerated, giving rise to the condition known as *atelectasis* [Ἀτελής = imperfect + ἔκτασις = expansion]. An infant thus affected looks as if it had only been born to die speedily. It is often jaundiced; it utters a weak whimper or cry; it can scarcely suck; it remains very feeble and drowsy; the surface is cold and slightly livid; and the chest is but partially dilated by the imperfect respiratory movements. After the lapse of a few days, or possibly weeks, the child either gradually becomes stronger, the paroxysms of dyspnœa materially lessen, and good health is ultimately obtained; or, in less fortunate cases, the symptoms increase, convulsions occur, and death ends the sufferings. To avoid this latter termination we must keep the infant wrapped up in flannel or cotton-wool, in a warm room; while it should be so placed, on a firm pillow, that the respiratory act may be impeded as little as possible. Stimulating oily liniments can be rubbed over the back and front of the chest, and along the spine. Ether with ammonia, or port wine with a few drops of tincture of bark, ought to be administered every few hours. If the air-tubes appear to be obstructed by mucus, an occasional mild emetic of ipecacuanha may serve to remove it.

And then, if the exhaustion be too great to admit of attempts at sucking, the mother's milk must be drawn off, and feeding with a spoon had recourse to.

XVIII. ŒDEMA OF THE LUNGS.

The effusion of a clear watery fluid, or of a sanguinolent serum, into the pulmonary tissue, is known as œdema of the lungs. It is a secondary affection of some consequence; since it may give rise to considerable suffering, while it often hastens death when connected with general dropsy. The fluid is probably exuded from the pulmonary vessels into the air-sacs and their partitions; as well as into the connective tissue around the bronchi, vessels, and lobules.

Œdema of the lungs may come on secondarily in Bright's disease, in valvular and other affections of the heart, and in general dropsy, &c. The suffocative dyspnœa which sometimes sets in suddenly during the progress of the eruptive fevers and other acute diseases, is probably due to this condition. Its symptoms are equivocal. Dyspnœa, slight cough, tightness or a sense of oppression about the chest, and the expectoration of a watery fluid, can only lead to a suspicion that there is pulmonary œdema. In some cases the expectoration is copious, colorless, frothy, and not very consistent; presenting an appearance compared by Laennec to that of white of egg dissolved in an equal part of water. Both lungs are generally equally affected. By percussion, a duller note than natural will usually be obtained. On auscultation, more or less moist crepitation can be detected.

The remedies needed will be those for the primary affection. Perhaps diuretics, with as much simple nourishment as can be assimilated, may prove serviceable. Tonics can seldom be borne by themselves; but in combination with drugs to act on the kidneys and skin they sometimes do good for a short time.

Further observations on the extravasation of blood into the air-sacs of the lungs (the so-called *pulmonary apoplexy*) are unnecessary after what has been said in Part I, section 7, sub-section 6.

XIX. PLEURISY.

Pleuritis, or pleurisy, are terms applied to inflammation of the pleura, the serous membrane investing the lungs and lining the cavity of the thorax. The disease will run either an acute or a chronic course; while one side is usually affected, though occasionally we have double or bilateral pleurisy. Uncomplicated cases very rarely end fatally.

Causes.—The most common causes of pleurisy, in subjects suffering from some morbid condition of the blood, are exposure to cold and wet, sitting or sleeping in damp clothes, &c. I do not believe, however, that any amount of cold by itself, will produce the disease in a healthy individual. It may prove the exciting, but not the essential cause of the inflammation. The statement has been made that in the greater number of cases of pleurisy

on the right side, the inflammation depends on the pre-existence of tubercle in the lung; while pleurisy of the left side is usually independent of this cause. In cancer of the female breast pleurisy often occurs secondarily, either from the irritation of the pleura by a deposit of cancer beneath it; or in some instances probably, as Dr. Walshe suggests, by the subinflammatory action on the confines of the diseased gland extending through the intervening tissues to the pleura. During the progress of continued fever, of an eruptive fever (especially measles), and of Bright's disease, an attack may set in. And, lastly, mechanical injuries will excite inflammation of this serous membrane. Thus the jagged ends of a fractured rib often give rise to it; while if they also wound the pulmonary pleura, air will escape from the lung into the pleural cavity.

Symptoms.—This disorder is ushered in with chilliness or slight rigor. Then follows fever, and an acute lancinating pain in the side, called a stitch; which pain is commonly seated below the nipple, over the antero-lateral attachment of the diaphragm. It is aggravated by the expansion of the lung in inspiration, by coughing, by lying on the affected side, and by pressure. There is also a short harsh cough, the skin remains hot and dry, the cheeks are flushed, the pulse is hard and quick, the respirations are slightly increased in frequency, there is anxiety with considerable restlessness, while the urine is rather scanty and high-colored. The temperature of the body gradually rises to perhaps 103°; but it probably never attains the height it acquires in pneumonia, and it usually falls with much more rapidity to 99.5°, and thence to the normal standard.

When we listen to the painful part of the chest at this period, we shall hear the dry inflamed membranes—the pulmonary and costal pleuræ—rubbing against each other, and producing a *friction-sound;* or if the hand be placed on the corresponding part of the thorax, this rubbing may be distinctly felt. But the sound soon ceases; either the inflammation terminates in resolution, and the two surfaces of the pleura regain their natural moisture and smoothness; or, the roughened and inflamed surfaces get adherent, the lymph which has been exuded forming a pseudo-areolar tissue; or they become separated by the effusion of serum, and a kind of dropsy results, known as HYDROTHORAX [Ὕδωρ = water + θώραξ = the chest]. If the pleurisy have been severe, the effusion becomes excessive (it may vary from a very few ounces to several pints); and the fluid accumulating in the sac of the pleura compresses the yielding lung, suspends its functions, displaces the heart, and somewhat distends the thoracic parietes.

When the pleuritic inflammation ends in suppuration, and the pus accumulates in the cavity of the chest, we have what is called EMPYEMA [Ἐν = within + πύον = pus]; a termination which is much more frequent in men than in women. Some practitioners speak of true and false empyema: the first form being that in which the pus is secreted by the pleura; while the second is that in which the pus finds its way into the cavity of the thorax from the rupture of an abscess of the lung. Now and then the pus forms a bulging tumor in one of the intercostal spaces, fluctuation generally being appreciable to the touch. Where the swelling is on the left side, a pulsation synchronous with the heart's beat may perhaps be observed. A careful examination will prevent "pulsating empyema" from being mistaken for an aneurism, since the tumor diminishes and increases with each inspiration and expiration, while there is neither an aneurismal thrill nor bruit. Nevertheless, if it be determined to evacuate the matter, a grooved needle should be introduced, as a precautionary measure, before using the bistoury. Occasionally ulceration takes place in the costal pleura and

gradually extends through the muscles, or a portion of the rib becomes carious, and an aperture is formed externally; through which channel (a *parietal fistula*) pus continues to be discharged for a long time in cases of chronic pleurisy. On the other hand, the pulmonary pleura may be perforated, and an opening take place into the air-tubes; which opening, when it fails to close after the evacuation of the fluid by the bronchi, is known as a *bronchial fistula*. The matter thus evacuated is usually most offensive.

Whether the matter effused consist of serum, or of serum mixed with blood (as in hydrothorax occurring in a scorbutic subject), or of pus, we shall find, on listening to the chest, that the respiratory murmur is diminished in proportion to the quantity of fluid thrown out. Where this is excessive and the lung is compressed backwards—flattened almost against the spinal column—no vesicular breathing at all will be heard; but instead, we shall detect the air passing into the larger bronchial tubes, the condensed lung and the layer of fluid acting as conductors of sound. We then say that *bronchial respiration*, and *bronchial voice* or *bronchophony* exist. The bronchophony may be accompanied by a tremulous noise resembling the bleating of a goat; it is then termed *ægophony*. If the lung be completely compressed, so that air cannot enter even the bronchial tubes, then no sounds of any kind will be heard; but on the healthy side the respiration will be more distinct than natural—will be *puerile*. There must also be dulness on percussion all over the affected side, if the pleura be full of fluid; if it be only partially filled, we can sometimes judge of the quantity by placing the patient in different attitudes, for since the liquid will gravitate to the most dependent part of the cavity, so it necessarily carries the dull sound with it. The exceptions to this rule which may be met with, consist of cases where there is solid exudation-matter as well as fluid; for if the pleura be coated with a thick pulpy surface, there will evidently be dulness on percussion in whatever posture the patient may be placed. We shall often more decidedly be able to judge of the amount of the effusion by noticing the dyspnœa which the patient suffers from, inasmuch as this will, of course, be most urgent when the lung is most compressed. At the same time, also, the sufferer is commonly unable any longer to lie on the sound side, for the simple reason that the movements of the healthy lung are then impeded by the superincumbent weight of the dropsical pleura. The pain, moreover, no longer prevents his lying on the diseased side. If we measure the two halves of the chest, the side containing the effusion will be found the largest; we must remember, however, that in many persons the right half of the chest is naturally rather larger than the left. In making an ocular examination of the affected side, it will be discovered enlarged; the intercostal muscles are seen inactive, and the spaces quite obliterated or even bulging if the secretion be copious; there is marked fulness of the infra-clavicular region, and the shoulder is depressed. From some inexplicable cause, pleuritic effusion occurs most frequently on the left side.

After a time the symptoms often begin to decrease, and absorption of the effused fluid fortunately commences. Supposing the lung to be bound down by adhesions, it will not be able to expand in proportion to the absorption of the fluid. The affected side consequently shrinks inwards, and instead of any longer remaining larger than the sound one, will become smaller.

With one form of the disease, known as *latent pleurisy*, there may be neither pain, cough, nor dyspnœa; and yet effusion may go on until one-half of the chest becomes filled with fluid, as shown by the physical signs.

The presence of air in the pleura will occasionally be found to be due

to other circumstances than the injury produced by a broken rib. Thus, it may arise from an external wound, as well as from ulceration owing to the extension of a tubercular cavity. When the pleura contains air alone we say there is PNEUMOTHORAX [*Πνεῦμα* = air + *θώραξ* = the chest]; when, as generally happens, there is a liquid with the air, we call the disease PNEUMOTHORAX WITH EFFUSION. The physical signs of pneumothorax are abnormal resonance on percussion, and loss or indistinctness of the respiratory murmur on auscultation. The patient's breathing, cough, and voice, give rise to a ringing metallic noise like that produced by blowing obliquely into an empty flask, and hence called *amphoric resonance*. When there is also liquid with the air, we obtain in addition (especially on practicing succussion) a sound known as *metallic tinkling*; which some authorities believe to result from a drop of fluid falling from the upper part of the cavity and causing a little splash, but which is in all probability simply due to the bursting of an air-bubble in a confined cavity with firm walls.

Diagnosis.—The distinction between pleurisy and pleurodynia (pain in the muscles of the thorax) is rendered so easy by attention to the foregoing description of the symptoms that nothing more need be added. Malignant disease of the lung or pleura is more likely than any other affection to be mistaken for empyema, since in both of these instances there has generally been pleurisy, while in both there may be displacement of the heart, dulness on percussion, absence of respiratory murmur, inability to lie on the sound side, and œdematous enlargement of the affected side. Again, empyema of the right pleura is not always easily diagnosed from enlargement of the liver; but the difficulty will be lessened by noticing that in the latter there is no intercostal paralysis, there is resonance on percussing the middle and upper parts of the chest, the force of the respiratory murmur in the postero-inferior portion of the chest is much greater than the dulness would lead us to anticipate, and the heart is displaced upwards instead of laterally.

Prognosis.—Simple unilateral pleurisy always terminates favorably. Even when it is bilateral, or when it occurs during the progress of some chronic ailment—as Bright's disease, tuberculosis, cancer, &c.,—it is not often the immediate cause of death.

Treatment.—The indications for the treatment of pleurisy are first, to subdue the inflammation; and secondly, to promote the removal of its products. To obtain these results the sufferer is to be kept very quiet in bed; while in order to prevent undue friction at the inflamed part, he should be cautioned against talking or taking full inspirations. The application of a fine flannel bandage round the chest, may sometimes be serviceable by lessening the movements of the ribs. As in all probability, the more the patient is lowered, the more severe will be the results of the inflammation, I would advise the practitioner not to resort to general bleeding; but rather to trust to the administration of diaphoretics (F. 211, 212), with opium to relieve the pain. Locally, no measures give greater relief than large and very hot and moist linseed poultices, covered with the extracts of poppies and belladonna (F. 297); or the use of poppyhead fomentations may be recommended, provided they can be sedulously applied. Some practitioners prefer the employment of sinapisms or turpentine stupes, but they have often the disadvantage of irritating the patient. When the pain is very severe, the removal of three or four ounces of blood by cupping will possible give relief sooner than any other proceeding, by unloading the congested vessels. The same effect can be brought about by the application of half a dozen leeches. But even before taking away this small quantity of blood, in subjects disposed to weakness, it will be better

to try the effect of the medicated poultices or fomentations; proceedings which I constantly resort to with the greatest advantage. If the practitioner have faith in the powers of mercury to control inflammation, he will administer calomel and opium; though it is very doubtful if the calomel can exercise the slightest beneficial influence. The bowels must be kept open by purgatives, if necessary. The diet should consist of gruel, arrow-root, plenty of milk, eggs, light puddings, and good broths; while cooling, refreshing drinks are to be freely allowed.

If these means prove insufficient and effusion take place, we must then endeavor to promote absorption. The patient had better be kept on a moderate diet, free from stimulants; a succession of flying blisters ought to be applied to the diseased side, or the action of the absorbents may be increased by sinapisms, or friction with the ointment of red iodide of mercury can be tried; and purgatives as well as diuretics are to be administered. The iodide of potassium (F. 31) will often be useful; or a combination of squills, digitalis, and blue pill (F. 28), has been highly recommended. Very often, however, mercury in any shape administered internally does harm; and especially if the effusion be due to chronic pleurisy, or if there be any tubercular or cancerous deposit. In such cases the compound tincture of iodine, or the iodide of iron, or cod-liver oil, are more likely to forward our views.

When the foregoing remedies fail, tapping the thorax, so as to let the fluid out, has been resorted to, and on many occasions with success. The opinions of physicians vary widely as to the propriety of performing this operation.* My own impression is, that as a general rule it ought not to be performed unless the effusion is excessive; nor until proper attempts to procure absorption have been adopted. In any instance, if we felt satisfied that the pleura was full of pus, an operation should be performed; but I know not how it can be decided whether such is the case, or whether the effusion is only of the nature of a serous fluid. The question is always a very important one, for if tapping be determined on it is by no means to be left as a last resource; inasmuch as if deferred too long, irremediable mischief takes place in the lung. Thus, ulceration of the pulmonary tissue may take place and extend until a large bronchus is opened; through which the contents of the pleural sac will pass upwards to the trachea, and so be expelled. An opening thus formed closes only for a time. The pleura goes on secreting pus, and at the end of a few days this is again brought up as before. So matters go on until death perhaps occurs. In other instances too, the lung becomes carnified, and deprived forever of its power of expanding; while the pleura continuing to secrete fluid, bands

* This discrepancy can scarcely be better illustrated, or less satisfactorily accounted for, than by the following facts: Drs. Hughes and Addison were both physicians at the same time to Guy's Hospital. The former (Guy's Hospital Reports, second series, vol. ii, p. 48, London, 1844), speaks in high terms of the good which he has seen effected by tapping the chest in numerous cases, and the facility with which it may be performed. The latter gentleman (Lancet, November 17th, 1855) says he believes, from the numerous cases seen every year at Guy's Hospital, that paracentesis thoracis is one of the worst and most deceiving operations in general practice. A serous cavity, he thinks, is almost invariably changed into a cavity pouring out purulent matter by the first operation; and the thick, leather-like, false membranes lining the pleura soon make the operation one of very great difficulty and danger. Nature herself, if assisted by proper remedies, will often remove serous effusions from the pleura; but if once interfered with by instrumental assistance, the amount of pus separated from the system is almost incredible, and beyond her power to get rid of. Cases are mentioned of twelve and fourteen pints of purulent matter drawn from the chest, but its production is very possibly due to the first opening made in the pleura.

are formed between the pulmonary and costal portions which lead to future contractions of the chest. Supposing it is decided to resort to paracentesis, it will be as well to commence by making an exploratory puncture with a grooved needle; when, if fluid issue, a trocar and canula may be introduced. The best position for the puncture is probably the intercostal space between the fifth and sixth true ribs, at or somewhat anterior to the digitations of the serratus magnus muscle; provided, of course, that the lung is not fixed to this part by adhesions, and that no good reason exists (such as the pointing of the tumor) for selecting a different spot. It will probably be better to remove all the fluid. If serum come out, the orifice should be closed and healed; if pus escape, the aperture may be enlarged and kept open by a piece of catheter, or an india-rubber drainage-tube. When this tube is employed, two openings have to be made, as recommended by Dr. Goodfellow and Mr. Campbell de Morgan. The operation is a simple one, as performed by the latter gentleman. A puncture, with a trocar, or a simple incision, is to be made into the cavity of the chest, at the usual place (between the fifth and sixth, or sixth and seventh ribs), or indeed in any convenient situation. A firm long iron probe, somewhat bent, is then passed through the opening, and directed towards the lower and back part of the cavity—the lower the better. If the end of the probe be pressed against the inside of the thoracic walls, it may be distinguished from the outside through the intercostal space—perhaps obscurely, owing to the thickness and toughness of the false membrane within. The lowest site in which the probe can be felt having been selected, an incision is made upon its end, which is then pushed out of the opening thus formed. A strong piece of waxed twine is passed into the eye of the probe, and drawn through the two openings; and the drainage-tube, perforated at short intervals, being firmly tied to one end, is then pulled through by means of the twine. The ends of the tube are fastened together, and the operation is completed. The pus drains away through the perforations. The admission of air through the tube, or through the canula of the trocar, into the pleura does no harm, for it becomes spontaneously removed in a few hours. It must be remembered that the intercostal artery has been wounded in the operation of tapping, giving rise to serious hæmothorax [*Αἷμα* = blood + *θώραξ* = the chest]; an accident which may be best avoided by keeping free of the borders of the ribs.

Where the dyspnœa has been very urgent in some examples of pneumothorax, it has been found necessary to puncture the pleural cavity with a grooved needle to let the air escape. Such cases, however, are very exceptional.

XX. PNEUMONIA.

Pneumonia, or more correctly pneumonitis [from *Πνεύμων* = the lung + the terminal *-itis*], or acute inflammation of the substance of the lung, is a serious disorder, though its fatality has been diminished by our improved practice. The disease is commonly ushered in by restlessness with general febrile disturbance. At the end of from one to three days there are rigors, soon followed by nausea, cough, pain in the side, distressed breathing, a pulse reaching to 140 or even 160 beats in the minute, burning heat of skin, thirst, loss of appetite, prostration, headache, and sometimes transient delirium. Frequently, no notice is taken of the primary restlessness, so

ıe patient describes the succession of his symptoms as shivering, fever, and breathlessness.

h case of pneumonia may be said to consist of four degrees or stages, rst, that of congestion of the pulmonary membrane, with dryness; lly, that of engorgement or splenization; thirdly, that of red hepatiza- and fourthly, that of gray hepatization or purulent infiltration. In stage there is, speaking summarily, fever, the temperature rising to- the end of the first day to 101° or even 102.5°, and gradually increas- ıtil the fifth or sixth day, when it will probably be as high as 105°

Next we have more or less pain in some part of the chest—most at the commencement—together with accelerated and oppressed ıing. There is great depression, with occasionally delirium, and then d a very distressing cough, with expectoration of viscid and rust- d sputa, which unite into a mass so tenacious that even inversion of ssel in which it lies will not detach any portion. If these sputa be ɔly examined, they will be found to consist chiefly of mucus, epithe- ɔxudation-matter, blood-cells, and oil-globules; the presence of sugar ɔmetimes be detected by Trommer's test, while there is also an excess ɔride of sodium. Moreover, as the blood contains an undue amount in, coagula may form in the right side of the heart or in the pul- y arteries, and give rise to urgent dyspnœa, or even to sudden death. ing the *first* stage, or that of *dryness of the pulmonary membrane*, is no crepitation to be heard, but simply a harsh dry respiratory ır. The percussion-note is natural. The skin is hot and dry, the nd respirations are frequent, and there may be pain over the affected The duration of this stage does not exceed twenty-four hours.

ɯcond stage, or that of *engorgement*, is that in which the air-cells of ɔcted part of the lung become loaded with blood or bloody serum. ıflamed portion of lung is of a dark-red color externally, and on ; into it a quantity of red and frothy serum escapes, while its appear- omewhat resembles the spleen, its elasticity and sponginess being ɜhed, though it will float in water. If the chest be listened to when ıg is in this condition, we shall hear very fine crepitation, a sound is known as *minute crepitation* or *crepitant rhonchus*. If a lock of wn hair be rubbed between the finger and thumb close to the ear, ł will be produced nearly resembling it. The natural respiratory cular murmur is still heard mingled with this minute crepitation, lly at the beginning; as the inflammation advances, however, the r sound is quite displaced by the morbid one. Percussion, also, at fords almost the natural resonance; gradually this becomes decidedly ɔd.

ɔre the inflammation proceeds, it passes into the *third* degree, or that *tization;* in which the spongy character of the lung is quite lost, and ture becomes hard and solid—resembling the cut surface of the liver, ; it is said to be hepatized. If we now practice auscultation, neither ıute crepitation nor the vesicular murmur will be any longer per- e. *Bronchophony*, however, often exists, more particularly if the nation be seated near the upper part or in the vicinity of the root of gs; and it is accompanied also by *bronchial respiration*, these sounds ɔonducted by the solidified lung. The resonance on percussion is er the whole of the affected part.

ancing still further, we now have the *fourth* stage of pneumonia, or *gray hepatization*, or *purulent infiltration;* which consists of diffused ıtion of the pulmonary tissue, parts of the lung remaining dense and ıeable. In many instances there is no true suppuration, the appear-

ance of such a condition being simulated by liquefied exudation-matter. Circumscribed abscess of the lung is very uncommon; but diffused suppuration is said to be a frequent consequence of inflammation of the pulmonary tissue. There are no physical signs by which this stage can be diagnosed, until part of the lung breaks down and the pus is expectorated; *large gurgling crepitation* will then be heard.

If the inflammation subside before the stage of purulent infiltration, as it fortunately often does, then the febrile disturbance decreases, the temperature drops towards its normal standard, the cough becomes less irritable, and the general distress mitigates. Still the frequency of the pulse, and the hurried breathing, continue until the lung begins to lose its solidity. The hepatized condition may, however, remain permanent; though as a rule it will gradually pass away. In the latter case we shall find the air slowly re-entering the lung; as will be indicated by a return of the minute crepitation, mingled with—and subsequently superseded by—the healthy vesicular murmur.

When the urine of a healthy person is treated with nitrate of silver,* after being acidulated with nitric acid, the copious precipitate of chloride of silver which is thrown down shows the presence of a considerable quantity of chlorides. In pneumonia, a normal amount of the chlorides may be found for the first day or two; but the quantity gradually diminishes as the inflammation advances, until by the time hepatization is perfect they have entirely disappeared. As the hepatization recedes, so the chlorides reappear; continuing to increase as convalescence favorably progresses. Dr. Redtenbacher further observed that the more intense the inflammation, the greater was the diminution in the chlorides; while the rapidity or slowness of the decrease or increase was in constant relation to the rapid or slow course of the disease. Dr. Beale, in confirming the important views of Redtenbacher, says: "There is reason to believe that the absence of the chloride of sodium from the urine during the stage of hepatization, depends upon the determination of this salt to the inflamed lung; and that when resolution occurs, this force of attraction ceases, and whatever salt has been retained in the lung is reabsorbed, and appears in the urine in the usual way."† It must be remembered, however, that a deficiency of chloride of sodium, or its total absence from the urine, is not peculiar to cases of pneumonia, nor even to acute inflammations generally. According to Neubauer and Vogel, the diminution depends chiefly upon the loss of appetite, and the saltless nature of the diet of the patients; in addition to which there are occasionally abstractions of chlorine from the blood, as in diarrhœa, exudations, and pneumonic sputa.

Occasionally, in depressed constitutions, as well as where the system is contaminated by syphilis, acute inflammation of the lung terminates in *diffused* or in *circumscribed gangrene*. Sphacelation may also arise from other conditions than pneumonia; as, for example, from tubercle, cancer, hemorrhage, the presence of morbid poisons in the blood, and disease of the brain causing perverted innervation of the lungs. It occasionally occurs in children after the eruptive fevers, or as an accompaniment of cancrum oris. The characteristic symptoms of such an occurrence are an intolerably fetid state of the breath, resembling the odor which proceeds

* Nitrate of silver, added to healthy urine, throws down a whitish precipitate, which consists of chloride and phosphate of silver. A few drops of nitric acid will dissolve the phosphate, leaving the insoluble chloride. The chloride of silver is readily soluble in a little ammonia. Nearly all the chlorine contained in the urine occurs as chloride of sodium.

† Medico-Chirurgical Transactions, vol. xxxv, p. 375. London, 1852.

from external gangrenous parts; together with dyspnœa, and very great prostration. The physical signs are those of softening and excavation of the pulmonary tissue. The disease is usually more extensive and progresses more rapidly in diffused than in circumscribed gangrene. Unless the mortified portion be small, death will in all probability result.

During old age, as well as in some forms of insanity, an attack of pneumonia now and again runs its course and even ends fatally, before its presence has been suspected. I have seen one lung in an old woman 70 years of age quite solid from hepatization, and who died as it was said suddenly. For her pulse had not been above 90 for weeks before her death, her skin had not been unduly hot, and when she was quiet there had been no dyspnœa. No exammination had been made of the chest during life, for the simple reason that no disease had been suspected there by her medical man. Similar cases are now and then met with in lunatic asylums.

Chronic pneumonia may occur as a sequel of the acute disease; or it can be set up by the irritation of gummata in advanced forms of syphilis. However produced, it now and then gives rise to persistent consolidation of a portion of the pulmonary tissue, which may be mistaken for solidification resulting from tubercular deposit. This error is the more likely to be made, seeing that the general symptoms are partly those of phthisis; such as weakness, emaciation, cough, pallor, a sense of oppression within the chest, and loss of appetite. Slight hæmoptysis occurs very rarely; while attacks of feverishness, of night sweats, and of diarrhœa, are remarkable by their absence. Iodide of potassium and bark, or iodide of iron, or ammonia and bark, with cod-liver oil or glycerin, and good diet, are the remedies to be trusted to.

With regard to the *pathology* of pneumonia it seems certain that the disease essentially consists of an exudation into the air-sacs themselves. There is no interstitial inflammation, as was long taught, because there is no connective tissue between the air-cells to get inflamed. The matters poured out from the vessels in the walls of the air-sacs consist of serum, lymph, and subsequently of purulent fluid. At the same time that the cell-cavities get thus loaded, the thin fibrous structure of their walls doubtless becomes infiltrated with exudation-matter.

Whether the capillaries of the pulmonary artery, or those of the bronchial arteries, or both sets, are the vessels mainly affected in pneumonia, is a question which has not been positively determined. Dr. Waters has argued, that the branches of the pulmonary artery which constitute the pulmonary plexus are the nutrient vessels of the air-cells and the seat of inflammation in pneumonia; because although the bronchial arteries pass along the bronchial tubes and supply the structures of those tubes and the connective tissue of the lungs, yet they send no branches to the walls of the air-sacs, which are solely occupied by the plexus formed by the pulmonary artery. Dr. Morehead on the contrary has reasoned that if inflammation be an altered state of the nutritive processes of the affected part, then the capillaries immediately concerned in inflammation must be those which in their normal state circulate arterial blood for nutrition; that the blood which is a factor in inflammation, must be blood which normally is a factor in nutrition. It is maintained, therefore, that the capillaries of the bronchial arteries are those immediately concerned in the nutrition of the air-cells, and therefore in pneumonia; chiefly for the reason that they are the nutrient vessels of the visceral pleura, of all the tissues of the bronchial tubes, the coats of the bloodvessels, the nerves and lymphatics, and the connecting areolar tissue of the lungs, as well as the seat of inflammation in visceral pleuritis and bronchitis.

Pneumonia may affect one lung or both; or, technically speaking, it may be double or single. The right lung suffers from inflammation nearly twice as often as the left: about once in eight cases both are affected. The lower lobes are more obnoxious to inflammation than the upper. The average duration of the disease when uncomplicated is about fourteen days: when complicated, not less than twenty-one days. Mild cases, unless subjected to heroic treatment, are often fairly convalescent on the ninth day. In fatal instances death occurs between the sixth and the twentieth days. Pneumonia destroyed life in 25,155 cases in England, during the year 1866 (see p. 458); the mortality being greatest in the winter quarters. Of this number of deaths those occurring in children under 5 years of age were no less than $\frac{\text{Males } 9844}{\text{Females } 7676} = 17{,}460$.

Pneumonia without a degree of bronchitis is probably never seen. It may happen with or without pleurisy. Supposing the pneumonia forms the chief disease, the double affection is termed *pleuro-pneumonia:* while when the pleurisy predominates, it is sometimes called *pneumo-pleuritis.*

The *treatment* of pneumonia remains to be considered. After what has been said, however, in speaking of the remedies for inflammation, only a few remarks are called for. Bleeding, tartar emetic, and mercury, are the agents on which we have been mainly taught to rely; but these remedies will, I feel convinced, do much more harm than good if applied to the treatment of inflammation of the lungs in the present day. It is the more necessary to insist upon this point, because some of our text-books still advocate depletion; although more than twenty years have elapsed since Dr. George W. Balfour showed very strikingly the good results obtained by Skoda at Vienna, while withholding all active medication from his pneumonic cases. In recommending the adoption of a very simple line of practice, therefore, I am only doing that which both my reading and experience have long taught me is much the best, not only for the ultimate safety of the patient, but even for diminishing the duration of the disease. I am quite alive to the argument that whereas our ancestors bled too much, we may fall into the opposite error, and bleed too little. But whatever may be said upon this head, it can only be replied, that the practitioner is advised not to have recourse to antiphlogistic remedies in the treatment of pneumonia, because it is firmly believed that no amount of venesection can remove the exudation which has taken place into the air-sacs; while the more the patient is weakened the greater will be the fear of our failing to restore him to health.

When the case is first seen, attention must be paid to the bowels, a dose of castor oil being given if necessary. The most perfect quiet in bed is then to be enjoined; the air of the sick-room being kept moist by the evaporation of boiling water, while the temperature should not be allowed to fall below 65° Fahr. From two to four fluid drachms of the liquor ammoniæ acetatis, freely diluted, may be given every three or four hours according to the action of the skin, with or without a few drops of the wine of colchicum; while small doses of opium are also to be administered, if there be pain or restlessness. The vapor of chloroform can occasionally be used to relieve the cough and dyspnœa; but I have had no experience in the treatment by full inhalations repeated every three or four hours. When the patient's constitution is feeble, a draught containing an excess of ammonia, according to F. 212, is to be ordered. At the same time, large linseed poultices or poppy-head fomentations must be directed to be properly used over the affected side; or if the pain be bad, recourse had better be had to turpentine stupes night and morning. All that is necessary besides is a light diet with a free supply of cold water; together with milk, strong beef tea,

and tea with milk. Moderate quantities of wine or brandy, somewhat in accordance with the patient's ordinary habits, may be prescribed as soon as there are any indications of greater weakness than can safely be borne. Where the crisis occurs by sweating or by diarrhœa, care must be taken not to check it unnecessarily; while during convalescence milk and cream, raw eggs, animal food, and wine may be allowed with discretion. Few tonics will then be more useful than ammonia and bark (F. 371); followed subsequently by quinine and steel (F. 380), with perhaps cod-liver oil.

In some very severe cases the only question is how to keep the patient alive, until the exudation-matter occupying the air-cells becomes absorbed. Under these circumstances brandy is invaluable; but it must be freely administered, possibly even to the extent of half an ounce every second hour, in milk or water or beef tea, for one or two days. The brandy and egg mixture (F. 17) does good. The essence of beef (F. 3) will also prove useful.

Should the inflammation end in *gangrene*, stimulants and tonics are then especially needed. When the odor of the breath is very offensive, the solution of chlorinated soda (F. 76) may be prescribed. Ammonia and bark, or chlorate of potash and steel, with cod-liver oil, are valuable remedies. The inhalation of spray medicated with creasote or carbolic acid (F. 262), every eight or twelve hours, can be strongly advised. Dr. Skoda, of Vienna, has published several cases in which the symptoms gave way on the use of terebinthinate vapors and the free exhibition of quinine. The inhalations he used were made by pouring oil of turpentine on boiling water; the vapor being inspired for about fifteen minutes every two or three hours. Wine and nourishment in as large quantities as can be assimilated by the weakened digestive organs, will be required.

XXI. PHTHISIS.

The name of Phthisis [from *Φθίω* = to waste away] has usually been regarded, until very recently, as synonymous with tubercular disease of the lungs. The time, however, seems now to have arrived when it may advantageously be allowed that several diverse affections, radically distinct from each other, should be included under the common designation of phthisis, or pulmonary consumption. Instead, therefore, of restricting these expressions to indicate that morbid condition which arises from the deposit of tubercles in the lungs, they ought to be employed as generic terms for those pulmonary diseases which are characterized at first by progressive condensation, and subsequently by suppurative degeneration with excavation, of the affected portions of lung-tissue; these local changes being in some instances preceded, in others only followed by constitutional disease.

What then are the diseases which lead to ulceration and destruction of the lung-tissue; in other words, what are the varieties of phthisis? Arranged in the inverse order of their importance, we are at present justified in recognizing the following:

(1.) *Hemorrhagic* and *embolic* phthisis; in which there is cheesy disorganization and disintegration of blood-clots (after pulmonary extravasation), or of deposits produced by pulmonary emboli from the liver or veins, as well as of those portions of lung-tissue affected by the foreign matter.

(2.) *Bronchial* and *pneumonic* phthisis; attended with ulceration of the bronchi and air-sacs, as well as with cheesy degeneration and disintegration of any bronchial or pneumonic exudations or deposits which have occurred. This variety should include those cases hitherto described as forms of mechanical bronchitis; in which the morbid action is set up by the inhalation of different particles of matter that irritate the tubes and their terminal extremities, the air-sacs. We have thus the so-called grinders' asthma, or knife-grinders' rot; carbonaceous bronchitis, or black phthisis, or miners' asthma, occurring in miners from the inhalation of the lamp-smoke, and the inspiration of the carbonic acid gas formed in the pits; millstone-makers' phthisis, observed in stonemasons and others; and cotton pneumonia, or cotton phthisis, met with amongst the operatives in cotton-mills.

(3.) *Syphilitic* phthisis; being that condition in which there is deposition or infiltration of gummatous matter through more or less of the substance of the lungs, with subsequent cheesy degeneration. It has already been shown that a chronic erythematous inflammation of the mucous lining of the bronchi may occur as a part of the constitutional lesions of syphilis. But in the class of cases now referred to, gummatous nodules are produced in the pulmonary substance; these deposits being at first very hard, though subsequently undergoing a process of softening and decay. Not unfrequently this disease becomes associated with tuberculosis; so that in a case of phthisis, attended with nodes on the tibia and other marks of syphilis, the conclusion must not be too readily jumped at that a cure is to be effected by iodide of potassium and such-like remedies. When small syphilomata exist alone, however, even though they have softened and produced little vomicæ, attempts at cure can be hopefully made. That well-directed efforts have been attended with success cannot be doubted, because the cicatrices of healed cavities have been found after death has happened from other causes.

(4.) *Fibroid* phthisis (described by some authors as cirrhosis of the lung, interstitial pneumonia, &c.) is usually that state in which systemic disorder localizes itself, more or less completely, in one or both lungs in the form of a fibroid exudation. Occasionally, perhaps, the disease is local—confined to the lung. When of constitutional origin, the general affection may be due to rheumatism or gout, syphilis, an unhealthy mode of life, abuse of alcoholic drinks, &c. Sometimes, also, in addition to the pulmonary mischief, there is a similar degeneration of the endocardium, liver, kidneys, capsule of spleen, and other organs. The leading features of the lung mischief are very characteristic; this organ being found heavy and tough, indurated and contracted, either by fibroid tissue or by a fibrogenous material involving dilated bronchi. Moreover, portions, but especially the inferior lobes, are invaded by cheesy deposits and small cavities. The tough fibrogenous exudation is either identical with amyloid substance, or nearly related to it. The pleura is occasionally much thickened, having fibrous bands passing from it into the lung-tissue. The left lung is more frequently invaded than the right; but both will be involved more often than one. The bronchial glands may be enlarged and indurated. Usually, the disease progresses slowly. At times these cases are complicated with tuberculosis; a complication which appears to lengthen life by delaying the disintegration of the tubercles. Death occurs from exhaustion, or from some intercurrent attack of pleurisy or bronchitis or pneumonia, or even hæmoptysis.

Perhaps the most instructive case of fibroid phthisis on record is that

reported by Dr. Andrew Clark.* The patient was the subject of constitutional fibroid degeneration (fibrosis); which, while affecting different textures, especially and destructively localized itself in the left lung. The mischief in the latter appeared to commence about July, 1867. The prominent symptoms and signs were vomiting, prostration, paroxysmal cough, occasional hæmoptysis, muco-purulent expectoration containing lung-tissue, œdema of the extremities, albuminuria, and intermitting diarrhœa. The left chest-wall was unevenly depressed, and moved but slightly on inspiration. Percussion tympanitic in supra-clavicular region, breath-sounds blowing, resonance bronchophonic with echo. From the second to the fifth rib, and from near the sternum to the posterior part of the axillary region, there was hard resistant dulness, with considerable contraction of the chest-wall. In front of this region the inspiration was bronchial and accompanied by moist subcrepitant râles; expiration being dry, and not sensibly prolonged. At two spots about the middle of the axillary region the breathing was cavernous and the voice pectoriloquous. The inspiratory murmur over the lower part of the lung was harsh: fine dry crepitation was heard on forced inspiration. While in the London Hospital the condition varied but little. Sometimes there was obstinate vomiting; sometimes constipation, alternating with diarrhœa. No evening fever, no night-sweats. Pulse never rose above 92, respiration above 26, temperature above 99; while until near the close of life the figures were considerably lower. Upon great restlessness followed increasing weakness; then coma, and on December 3d, death. The necroscopy revealed, as had been predicted during life, fibroid disease of left lung, with dilated bronchi, cheesy deposits, and cavities arising from their disintegration; enlargement (and waxy degeneration) of liver; granular contraction (and some waxy change) of kidneys; ulceration of the bowels; enlargement of mesenteric glands, and fibroid degeneration of, or deposit in, other organs and tissues.

(5.) *Tubercular* phthisis, or pulmonary tuberculosis, is a destructive disease, attended by the growth and degeneration and disintegration of a lowly organized material called tubercle, which material is the local manifestation of that general unhealthy condition of the system known as scrofula. This, by far the most prevalent form of phthisis, is of such importance that it will be better to consider it in a separate section.

XXII. TUBERCULAR PHTHISIS.

Tubercular phthisis, or pulmonary tuberculosis, is a constitutional disease manifesting itself especially by certain very important and destructive changes in the lungs. The morbid action may run an acute or chronic course.

The *acute* form is not often observed. It commences suddenly with shivering, fever, rapid pulse, pain, cough, and dyspnœa; soon there is hectic fever, with profuse sweating and diarrhœa; there is rapid degeneration of

* Transactions of the Clinical Society of London, vol. i, p. 174. London, 1868. The student will also find an excellent essay on "Fibroid Degeneration of the Lungs," by Dr. Henry G. Sutton, in the Medico-Chirurgical Transactions, vol. xlviii, p. 287. London, 1865.

the lung-substance, so that small cavities form speedily; the increasing emaciation becomes daily more perceptible, and death may happen from exhaustion within as few a number of weeks as from three to twelve from the commencement of the disease. Generally the tubercular deposit is spread all through the lungs, while instead of being at first deposited in the upper lobes, it often begins in the middle and lower ones. Acute pulmonary consumption now and then occurs as the sole morbid state. It may, however, set in during the progress of chronic phthisis; or it occasionally proves the termination of some chronic malady, as was the case in a lady long under my care with pelvic abscess.

Chronic phthisis is that variety which is ordinarily met with; the symptoms, diagnosis, &c., of which will be presently detailed.

Pathology.—The origin and formation of tubercle have already been considered in the section on Scrofula with Tubercle (p. 130). It is only necessary to mention, therefore, that in phthisis the development of tubercle takes place in the interlobular connective tissue, in the air-cells themselves, and in the smaller bronchial tubes communicating with them; and that wherever a speck of this matter is formed, whether it be an exudation or a retrograde metamorphosis of pre-existing structures, it continues to increase by constant addition. In its hard state it is called crude tubercle. After a time, inflammation arises in the pulmonary substance surrounding the deposit, and suppuration occurs; the tubercular matter softening and breaking down, and at length being gradually expelled through the bronchi, and trachea, and mouth. Thus are left cavities or excavations of various sizes. Sometimes the cavities close and heal: more frequently tubercular matter continues to be deposited on their sides and in other parts of the lungs, until these organs become diseased to an extent incompatible with the continuance of life.

A more or less abundant deposit of tubercle is, at times, to be found in other organs as well as in the lungs. Thus, in many cases of pulmonary consumption, this material may be detected in the tissues of the intestinal canal, mesenteric glands, kidneys, peritoneum, liver, spleen, bronchial glands, heart and pericardium, or of the nervous centres. Moreover, fatty degeneration of the liver is a frequent accompaniment of phthisis; while less commonly the muscular fibres of the heart, and the middle coat of the aorta or other vessels, are found in a similar state of deterioration.

Symptoms.—The general symptoms of tubercular phthisis are gradually increasing cough, hæmoptysis, debility, expectoration, loss of appetite and a dislike to fatty food, dyspepsia in some form or other, acceleration of the pulse, pyrexia, slight dyspnœa, loss of flesh, sweating, and diarrhœa. Weakness of the voice or hoarseness is not uncommon. A mark at the reflected edge of the gums, usually deeper in color than the adjoining surface, and producing a festooned appearance by the accuracy with which it corresponds to the curve of the gingival border, was first observed by Dr. Theophilus Thompson to be very frequently present in these cases. A dull aching pain under the clavicles or scapulæ is often complained of, even when the amount of tubercle is small. Variously seated muscular pains are common; especially after any exertion which may be excessive in relation to the patient's powers. Sometimes, especially in males, the formation of an abscess by the side of the rectum, resulting in a fistulo in ano, is one of the earliest symptoms; a complication which, when left alone, becomes highly injurious by lowering the general strength.

Pulmonary tuberculosis ordinarily sets in with a short dry cough, which the patient often refers to the trachea. It is doubtless due to tubercular deposit irritating the bronchial membrane; it may continue some time

without being aggravated, or without the supervention of any other symptom; and each paroxysm is followed by the expulsion of a little thick semi-purulent expectoration. With other cases, the cough is loose, hollow, and less severe; being succeeded by a copious frothy phlegm, derived from the congested mucous membrane of the bronchi.

In about 50 per cent. of the cases, there is hæmoptysis; which, recurring at variable intervals, gives the patient the first unmistakable intimation of the disease. It occurs much more frequently in the first than in the second or third stages. The hemorrhage varies in amount from one or two drachms to the same number of pints. It may, indeed, be so considerable as to kill directly or indirectly. Dr. Walshe states that his analyzed series of 131 cases of phthisis furnishes but two examples of such mode of death. In one, death was direct from asphyxia, owing to the plugging of the trachea and bronchi with blood; in the other it occurred from exhaustion at the end of five days.* Now and then the rupture of an aneurism of the pulmonary artery has been the source of the hemorrhage. In a case which was under the care or Dr. Cotton at the Hospital for Consumption, and in which large quantities of blood were occasionally spat up for ten weeks before death, there was found in the left lung a tubercular cavity the size of a Tangierine orange, which was partially filled with the collapsed sac of an aneurism. This aneurism arose from one of the primary divisions of the left branch of the pulmonary artery; and prior to rupture must have been large enough to fill the vomica.

Among other symptoms the patient complains also of languor; slight exertion—ascending a hill or going up stairs—causes fatigue, hurries the breathing, and often gives rise to palpitation; the uterine functions are more or less disturbed in women; and the liver often becomes congested and tender. The tongue gets red and irritable; and aphthæ frequently form about the mouth and fauces. The mucous membranes of the bronchi, larynx, and pharynx are also very apt to become affected with a low form of inflammation; while occasionally tubercle is deposited in the submucous tissue of these organs, leading to ulceration and even extensive destruction. The latter is, I believe, most likely to occur when the fauces are relaxed and the uvula elongated; since the constant cough and irritation then set up prevent all attempt at reparation. Sometimes, where the perspiration is abundant, the patient and friends are much annoyed by the ill-smelling feet of the former; a condition, however, which can be cured by soaking the feet in tepid salt water night and morning, dusting them freely with powdered charcoal, and by wearing shoes with thin upper leathers and well open about the instep so as not to confine the transpiration. It is also remarkable that in some cases the nails become incurvated, while the ends of the fingers get a peculiar round or clubbed appearance. The latter is referred by M. Labalbary to the imperfectly arterialized state of the blood, and to venous stasis in parts furthest removed from the centre of the circulation; in consequence of which stagnation, tubercular matter is deposited from the blood. In cyanosis, the digital extremities sometimes assume the same character.

While the disease has been gradually progressing, the cough and expectoration have been increasing considerably. "The microscopical elements of phthisical sputa," says Dr. Walshe, "are very numerous. First, epithelium tessellated, cylindrical, and ciliated from the bronchial tubes; salivary fluid and epithelium from the mouth. Secondly, blood-disks (even when

* On Diseases of the Lungs, Heart, and Aorta. Second edition, p. 505. London, 854.

no reddish tint exists to the naked eye), melanic cells and molec
lecular fat, oil-globules, and saline matter, crystalline and am
Thirdly, exudation-matter in patches, exudation-cells, and
Fourthly, fragments of pulmonary fibre, capillary vessel an
Fifthly, dark molecular matter, soluble neither in ether nor i
chloric acid, and probably tuberculous,—and, in very rare ca
possessing the characters originally assigned by M. Lebert to
tubercle. I have, at least occasionally, seen in the opaque bu
striæ of comparatively clear sputa, cells non-nucleated and more a
outline than those of exudation-matter. Sixthly, the vibrio line
mycodermatous entophytes. Now the presence of fragments of ti
cates breakage of the lung-substance, and may furnish its earliest
The existence of tubercle-cells, if certain, is, of course, distinctive o
cal disease. Otherwise, the characters enumerated have no pre
nostic signification."* The plan hitherto adopted for finding p
tissue, has been to pick out from the sputum any portions which
be likely to contain elastic fibre. Dr. Fenwick advises, however,
expectoration should be liquefied by boiling it with a solution of
and then placing the fluid in a conical-shaped glass; upon doi
every particle of elastic tissue falls to the bottom and can be rem
placed under the microscope, as is done in the examination of u
posits. In this way he has easily found $\frac{1}{100}$th part of a grain of p
structure after it had been mixed in bronchial mucus, and he
that $\frac{1}{1000}$th to $\frac{1}{5000}$th part of a grain might be detected in any e
tion containing it.

As time goes on the mischief proceeds. Hectic fever appears.
a loss of all appetite, with thirst. The emaciation can be almo
advance daily. The hair gets thinned and quantities fall off on
it. The debility quickly gets more marked, the countenance
frequently flushed, and chilliness is complained of in the evening,
awaking in the night or early morning the body is found bathed
fuse sweat. Morever, in women there is a total cessation of the c
a very discouraging indication of want of vital power. The pa
continues to lose flesh, until he looks as if nothing remained but
bone. An unmanageable diarrhœa (which is due either to disorde
tions or to ulcerations of the mucous membrane of the ileum a
often sets in and greatly increases the debility, while the urine is s
found to contain albumen, and occasionally minute quantities
The lower limbs become painful and œdematous. The cough and
sputa continue, so that the sufferer is often unable to sleep for mo
few minutes at a time, owing to the necessity for expectorating.
desire for a frequent change of position, the cramps in the legs, th
of pain about the loins, the difficulty of micturition, the utter pr
and the ever-present dyspnœa,—all these troubles tend to rende
few nights most distressing, both to the patient and attendant
Death is looked forward to as the only available relief for the grea
and at this pass the sleep from which there is no awaking soon
scene, the mental faculties remaining clear until the last few hou

In some cases perforation of the lung happens towards the
then the resulting pneumothorax greatly adds to the sufferings.
Scott Alison points out, perforation is a natural consequence of p
excavation, and, were it not for the pleural adhesions, its occurre
be almost unavoidable. This condition is readily recognized by t

* On the Diseases of the Lungs. Third edition, p. 447. London,

dyspnœa which follows the formation of the aperture, by the tympanitic percussion-note, and by the occurrence (not constantly) of amphoric respiration and metallic tinkling.

During the progress of phthisis, as well as after its cure, the patient is liable to suffer from other diseases due to degeneration of tissue. The kidneys are more frequently affected than other organs, the morbid action consisting of fatty degeneration of the tubules. Thus is produced that albuminous condition of urine which has just been said to be by no means uncommon.

Diagnosis.—The attempt has been made by Dr. E. Smith to show that before the deposition of tubercle in the lungs, there is an abnormal physical condition of these organs and of the body generally, which manifests itself by certain indications. The physical signs of this so-called *tubercular state* are very slight subclavicular dulness, diminished vesicular murmur, less forcible and deep inspiration, and flattening of the apices of the lungs. If there are also symptoms of dyspepsia present, and certainly if there be likewise loss of weight, it seems to me that the evidence is in favor of tubercle having been actually deposited, rather than that it is only about to invade the lungs.

Many authors have divided the course of phthisis into three stages, a division which is convenient, to say the least. During the *first*—that in which tubercles become developed in the lungs—neither the local nor the general symptoms warrant us in positively announcing the presence of any other affection than severe catarrh. Directly there is any solidification, however, the respiratory sound during expiration becomes prolonged, an easily recognized sign of the earliest effect of tuberculization, which was first taught by Dr. Jackson of Philadelphia. When the tubercles are deposited in considerable quantity, the infra- and supra-clavicular regions will be found flattened, while there can likewise be observed defective expansion of the upper and front part of the affected side of the chest. The sound on percussion will be dull, or it may be morbidly resonant if the deposit extend to the costal surface directly to the trachea or large bronchi. There will be harsh or tubular inspiration; the act of expiration will be prolonged, owing to impairment of the elasticity of the lungs, and *bronchial respiration* and *bronchophony* can be heard. A distinct bruit, synchronous with the systole of the heart, may sometimes be detected under one or both calvicles. Speaking from my own experience, I should say that this *subclavian murmur* is more frequently present on the left than on the right side. It may proceed from the left subclavian, the innominata, or from the pulmonary artery, and it is due to pressure exerted on the vessel from behind. Hence it is not distinctive of tubercular deposit in a crude state, though in practice it will be found that this is by far the most frequent cause, inasmuch as solidification of the lung's apex except from tubercle is rare. In the *second* stage the tubercles have increased both in number and size, so as to compress and obstruct the substance of the lung and occasion dyspnœa, while they have also begun to soften and disintegrate. There is now marked depression of the infra- and supra-clavicular regions; the affected side is often contracted, owing to the destruction of the vesicular tissue by the pressure of the morbid material; there is a deficiency of movement and there is a stooping rounded back. The dulness on percussion is usually decided, though the note elicited may be normal, if the amount of tubercle be small and well surrounded by slightly emphysematous lung. On practising auscultation, *large crepitation* (*liquid* or *mucous râle*) will be distinct, and in the sound lung *puerile breathing*. In the *third* stage the softened tubercles are eliminated; they make an opening for themselves through

some of the surrounding or involved bronchi, and getting thus evacuated, they give rise to the formation of cavities. On inspection we observe a well-marked depression below the clavicle, the whole side is flattened and generally contracted, the intercostal spaces are much retracted, and the heart's impulse may be distinctly seen and felt to be most intense at a higher point than the normal one. Notwithstanding the existence of one large or of numerous small cavities, percussion almost invariably affords a dull sound, dulness existing even if the cavity (unless of great size) be empty, owing to the layer of lung forming the wall being dense and solid. Auscultation now elicits a peculiar sound called *gurgling*, caused by the bubbling of air with the pus or mucus contained in the cavity. Gurgling it must be remembered, may also arise from that rare disease, circumscribed abscess of the lung, as well as from the mixture of air with liquid in a dilated bronchus affected with chronic inflammation. When the cavity contains little or no liquid, we hear *cavernous respiration;* if it be large, *amphoric resonance* and *pectoriloquy* will also be distinguishable.

The *spirometer* is an instrument for measuring the volume of air expired from the lungs; and as this volume is always diminished in each stage of phthisis we have a rough kind of aid to diagnosis, for which we are indebted to Dr. Hutchinson. The quantity of air expired after the most complete inspiration is termed by this gentleman the *vital volume* or the *vital capacity*. Now the vital capacity always increases with stature; it will also be slightly affected by weight, but not sufficiently, as a rule, to interfere with the correctness of the following table, which is intended to show the capacity in health and in the three stages of phthisis. When the vital capacity is to be tested, the patient should loosen his vest, stand perfectly erect, take as deep an inspiration as possible, and then place the mouth-piece of the spirometer between his lips. The observer having opened the tap, the patient empties his lungs, making the deepest possible expiration; at the termination of which the operator turns off the tap, thus confining the air in the receiver. The receiver is then to be lightly depressed until the surfaces of the spirit in a bent tube on the outside of the instrument are on a level with each other, when the vital capacity may be read off from the scale.

Height.	*Capacity in health.*	*Capacity in Phthisis Pulmonaris.*		
		1st Stage.	2d Stage.	3d Stage.
Ft. in. Ft. in.	Cub. in.	Cub. in.	Cub. in.	Cub. in.
5 0 to 5 1	174	117	99	82
5 1 " 5 2	182	122	102	86
5 2 " 5 3	190	127	108	89
5 3 " 5 4	198	133	113	93
5 4 " 5 5	206	138	117	97
5 5 " 5 6	214	143	122	100
5 6 " 5 7	222	149	127	104
5 7 " 5 8	230	154	131	108
5 8 " 5 9	238	159	136	112
5 9 " 5 10	246	165	140	116
5 10 " 5 11	254	170	145	119
5 11 " 6 0	262	176	149	123

This table reads thus: A man whose height is between 5 ft. 7 in. and 5 ft. 8 in. should breathe in health 230 cubic inches: in the first stage of consumption this will be reduced to 154; in the second, to 131; and in the third, to 108 cubic inches. It must not be forgotten that the vital capacity is temporarily decreased by great fatigue, want of sleep or food, an attack of fever or any lowering illness, in short by whatever diminishes

'er of the muscles of respiration. As these are all obvious causes of l force, so they need not make the practitioner attach less im- ːe to the indications afforded by the spirometer in phthisis. They ıow that certain precautions are necessary in drawing conclusions ne data obtained.

ther very early, and therefore highly important, sign of pulmonary ɑption is *loss of weight*. A slow and gradual fall is more serious ı rapid and irregular diminution in weight; *a steady loss always pre- uberculosis*. Dr. Hutchinson, from an examination of 2650 healthy ; the middle period of life, has deduced the following table:

Exact Stature.		*Mean Weight.*			*Weight increased by 7 per cent.*		
Ft.	in.	St.	lbs.	lbs.	St.	lbs.	lbs.
5	1	8	8	or 120	9	2	or 128
5	2	9	0	" 126	9	9	" 135
5	3	9	7	" 133	10	2	" 142
5	4	9	13	" 139	10	9	" 149
5	5	10	2	" 142	10	12	" 152
5	6	10	5	" 145	11	1	" 155
5	7	10	8	" 148	11	4	" 158
5	8	11	1	" 155	11	12	" 166
5	9	11	8	" 162	12	5	" 173
5	10	12	1	" 169	12	13	" 181
5	11	12	6	" 174	13	4	" 186
6	0	12	10	" 178	13	8	" 190

reads: A man of 5 ft. 8 in. should weigh, in his clothes, 11 st. 1 55 lbs. (14 lbs. = 1 stone). He may exceed this by 7 per cent., ıttain 11 st. 12 lbs., or 166 lbs., without affecting his vital capacity; beyond this amount his respiration becomes diminished. Accord- M. Quetelet the average weight of the clothes at different ages is ıteenth of the total weight of the body, and one-twenty-fourth of the female.

r. Robert Boyd's article on *Vital Statistics and Pathological Contri-* it is mentioned that the mean height of 141 adult male paupers, d by Dr. Hutchinson, in the Marylebone workhouse, was a little an 5 ft. 3 in. and their mean weight 134 lbs. The mean height of e consumptive patients has been nearly 4 inches more, and their nearly one-third less. Hence it would appear that tall persons are bject to consumption. Moreover, the immense loss of weight is in scular structure, the several tissues, and the framework; since Dr. hows that the internal organs were all heavier than the healthy d.

s, &c.—Tubercular phthisis may be inherited or it may be acquired; ıo sense of the word can it be said to be contagious. Of 1000 his- ollected by Dr. Cotton, at the Consumption Hospital, 367 cases ereditarily predisposed; 582 being males, and 418 females. Until ıe year 1790 it was generally believed that phthisis was contagious. l the earliest traces of this doctrine in the writings of Aristotle, who ed B.C. 340. Galen, who was born about the year A.D. 130, seems adopted the same view; since he says that it is dangerous to pass le day with the consumptive. Lommius, about 1563, thought that a were contagious. Dr. Richard Morton, regarded as an authority lisease at the commencement of the seventeenth century, asserts that

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The Edinburgh Medical and Surgical Journal, vol. lxi, p. 290. 1844.

consumption may be communicated to a bedfellow like a malignant fever. Hoffmann, towards the close of the seventeenth century, taught that a natural predisposition to consumption might be called into action by attendance on a sufferer from consumption. Morgagni, writing in 1760, accounts for his having made but few dissections of this disease by expressing his fears of its infectious nature; while Portal, a few years later, hesitated to attend the autopsies of persons who had died from consumption. Cullen, in 1777, had never seen a case in which phthisis had been communicated from one person to another; though he would not assert that it is never contagious, especially in warm countries. This opinion seems to have paved the way for the modified view that there is only contagion in extreme cases; or, as Darwin said in 1793, between persons nearly connected. And so the idea of infection seems gradually to have died out; though Heberden in 1802 could not be convinced one way or the other. In 1808 Portal's fears as to the dissection of examples of fatal phthisis had vanished; and henceforth the idea of contagion was decidedly negatived. Nevertheless, during the last ten years some few authors, while declaring against contagion, have maintained that a close and devoted attendance upon one affected with phthisis has appeared to be accompanied with danger; while certain strong believers in non-contagion as a rule, have yet thought the disease might be transmitted by sexual intercourse or other intimate relations with an affected person.

The left lung suffers more frequently than the right: in Dr. Cotton's cases the left lung was affected in 455, the right in 384, and both were diseased in 161. The apices and posterior parts of the upper lobes of the lungs are ordinarily the situations in which the deposit first takes place. In some few instances, probably not more than one or two per cent., the development of tubercles begins at the base of the lung; the deposit gradually extending upwards. As these cases at the onset are apt to manifest the physical signs of pneumonia, especially persistent minute crepitation best heard about the angle of the scapula, and as there is steadily increasing dyspnœa with more or less fever, they have not unfrequently been erroneously treated. To avoid this mistake it is only necessary to observe that the general symptoms are not those of inflammation, but of the very opposite character,—of steadily increasing depression.

No period of life is exempt from this scourge. I have already shown that in the year 1866, considerably more than one-seventh of the whole number of deaths in England were due to scrofulous affections in some form or other; 55,714 of these, out of a total of 72,425, being registered as cases of phthisis. Insufficient and bad food, impure air, confinement, deficiency of light, long-continued grief, immoderate indulgence of the sensual passions, the poison of syphilis, and indeed whatever produces nervous exhaustion or impoverished blood, may be regarded as frequent causes. Its ordinary duration varies from about six to twenty-four months; it very rarely proves fatal in less than three months, unless indirectly from severe pneumonia or pleurisy.

Treatment.—This resolves itself into that necessary for the prevention of tubercular phthisis, and that to be adopted to stay its course when it has once developed itself. As regards prevention, I need only refer to the observations which have been made in the remarks on scrofula.

When the disease is present—when tubercles have become developed in the lungs, we must endeavor to *improve the general nutrition*, by attention to the quantity and quality of the food, by enjoining residence in a healthy climate (not necessarily a warm one), by ordering exercise in the open air, by taking care that the patient never sits or sleeps in a vitiated atmosphere,

uterfering in these cases should be disregarded, especially if the lung
be comparatively slight. On the same principle I have not hesi-
) remove uterine polypi; while in one instance I even operated
23d, 1861), on a case of vesico-vaginal fistula, where the lungs
ed tubercle; the cure of the opening which resulted not only having
e means of relieving the sufferer from constant distress, but in all
lity also of prolonging her life, for death did not take place until
9th, 1862.

gards the *diet* in phthisis, only the most nutritious food ought to be
; an animal diet being absolutely necessary, so long as the powers
stomach and alimentary canal are sufficiently strong to digest and
ite it. When the strength of the digestive organs fails, and when
acidity of stomach, pepsin (F. 420) with the two principal daily
hould be ordered. Milk and cream are very nutritious, and so are
s (F. 5, 15, 16). A mixture of cream and cherry brandy will per-
relished for a time. The addition of a teaspoonful of the saccha-
olution of lime to a tumblerful of milk will often allow this fluid to
coagulated into the duodenum, when it would not otherwise do so.
l allowance of brandy, or a moderate quantity of wine, or of good
le, or of Scotch ale, or of Guinness's stout, may always be advan-
ly permitted. Too long an interval should not elapse between each
t being much better to take food rather frequently, instead of making
wo heavy meals in the day.

ge of air is an important element in the treatment. Speaking gen-
phthisical patients require an elevated site upon a dry and porous
hey should avoid all places that lie low. One special object in
a selection is to get a locality where daily exercise may be taken
out the winter. If this can be obtained in the midst of beautiful
, so much the better. As a rule it must be recollected, however,
s change is to be resorted to only in the early stages and in chronic
for it is cruel to send patients away merely that they may die in a
country. When softening of the tubercles has begun, it will gener-
too late to expect much benefit; and certainly nought but mischief
ue from depriving a sufferer of the comforts of home when extensive
are formed. Phthisical subjects sometimes imagine that change of

home, are, the persistence of diarrhœa or dysentery, increased debility, serious disturbance of the functions of the liver, or any symptoms of a disposition to ague. In women, change of climate often disorders the uterine functions; in which case it is especially necessary that any tendency to menorrhagia be checked, since it will otherwise form a serious complication. Even a leucorrhœal discharge is very weakening; and therefore attempts ought to be made to stop it by astringent injections.

Torquay (F. 436), the *Undercliff of the Isle of Wight* (F. 434), *Sandgate* (F. 431), *Hastings* (F. 432), and *Penzance* (F. 436), are places in our own country admirably adapted for the winter residence of those consumptive invalids who need a relaxing or sedative atmosphere. But if a more bracing air be suitable we may recommend *Brighton* (F. 432), *Southport* (F. 438), *Queenstown* (F. 440), or *the Western Coast of Scotland* (F. 441). Frequently a more complete change of climate is wished for by the patient, who longs for a clear atmosphere and a cloudless sky. We may then send him to *Mentone* (F. 443), *Cannes* (F. 443), *Ajaccio* (F. 444), *Malta* (F. 449) *Malaga* (F. 445), or to *Algiers* (F. 451). The mild and equable temperature of *Madeira* (F. 452) renders it a fitting residence for patients whose pulmonary disorder is aggravated by an irritable condition of the mucous membrane of the larynx and bronchi; while it is also useful for invalids threatened with consumption. The colony of *Natal* (F. 453) is particularly healthy, and is certainly deserving of trial. There are many phthisical invalids who are always worse in warm than in cold weather, and for such *St. Moritz* (F. 500), in the Engadine (a valley of Switzerland lying between two principal chains of the Rhætian Alps), might offer a good residence. During the winter of 1867–68, a few consumptives had the courage to remain at Samaden (a village in the same valley as St. Moritz, from which it is distant about four miles); and I believe they all derived much benefit from the stimulating and bracing air. The climate of *Canada* (F. 454) is salubrious; the great cold of the winter being mitigated by the dryness of the atmosphere and the absence of high winds. And, lastly, where a sea-voyage is indicated I have found no change so beneficial as a trip to *Australia* or *New Zealand* (F. 574), in a well-appointd vessel. While these recommendations were being first written (August, 1864), I received a letter from a gentleman who reached New Plymouth on March 24th, 1864, in tolerable health. At the end of the summer of 1863, it had been necessary to remove him from Hastings in an invalid carriage; so shattered by a prolonged attack of hæmoptysis, that he could scarcely turn himself in bed. Had he remained in England during the inclement winter of 1863–64, I believe he would have died before its close. Yet he improved directly he got to sea, by the end of November, and was able to be on deck for some hours every day during the voyage, suffering no inconvenience whatever until the provisions began to run short, and diarrhœa returned to a slight extent.

Since this case occurred I have known of other instances where great good has accrued from a similar voyage. Even the anticipation of the change from a dreary sick-room buoys up hope, and seems to renovate the system. And though a passage of some eighty days appears long, yet I have found patients wonderfully like Mr. Micawber, who, as he was about to go from London to Canterbury talked as if he were proceeding to the farthest limits of the earth, and when he went from England to Australia spoke as if he were taking a little trip across the Channel. As our old friend said, "It's merely crossing. The distance is quite imaginary."

With respect to *drugs*, there are certain agents which must be especially mentioned. *Cod-liver oil* (F. 389) is a most valuable remedy; it nourishes the body; diminishes the cough, expectoration, sense of exhaus-

tion, and night-sweats; and, there is every reason to believe, checks the exudation of tubercular matter. In the beginning, a teaspoonful should be given twice or thrice daily, and gradually increased to a tablespoonful three or four times a day; remembering that it will be more easily digested if taken directly after the meals. If there be much acidity of stomach, the oil may be made into an emulsion with *lime-water;* or if it produce nausea and heartburn, then four or five grains of *pig's pepsin* in a pill can be given with each dose. Dr. Horace Dobell has advised the use of *pancreatin*—the active principle of the pancreas—for aiding the digestion of all oleaginous and fatty substances, whether they be taken as food or medicine. The dose is from six to eight grains, in water or ginger wine, taken directly after a meal. I confess, however, that pancreatin has not appeared of as much service in my hands, as was anticipated from the eulogistic reports of others. When there is great rapidity of the pulse, the ozonized oil, as recommended by Dr. Symes Thompson and his father, is deserving of trial; for in twenty cases, in which it was administered by the former gentleman, the pulse was reduced more that twenty beats a minute in eleven, and to a less extent in seven of the remainder. Where the stomach will not tolerate any form of cod-liver oil, enemata containing it may be resorted to; or this agent may be introduced into the system by inunction (F. 283), and by applying lint saturated with it to the chest. Inunction with the best *sperm oil* has also proved rather useful in my hands. *Cocoanut oil*, especially in a mixture with the *citrate of iron and ammonia* (F. 391), merits a trial in these instances. *Glycerin* is certainly very inferior in its effects to cod-liver oil, while it often has the disadvantage of relaxing the bowels; but it may at times, and in exceptional cases, be found efficacious. The dose varies from one to four teaspoonfuls two or three times a day; and it can either be given with some bitter infusion, or with the *syrup of iodide of iron*, or with the *tincture of perchloride of iron* (F. 392), or with *quinine*, &c.

The various preparations of *iron* (F. 380, 394, 397, 401, 403, 405, &c.), are very useful in many cases; especially during the second and third stages of the disease, provided there be neither hæmoptysis with a full pulse, nor pulmonary congestion. Supposing the use of steel to be indicated where there is hemorrhage from the lung or a tendency to it, no preparation will be found more useful than iron alum (F. 116). *Iodine* and its compounds, especially the iodide of potassium, have been highly praised; the iodide of iron is the best preparation, though I have but little faith in it. *Bark* is an excellent tonic; and I have frequently seen much good from giving one or even two drachms of the compound tincture three or four times in the twenty-four hours. The officinal liquid extract of yellow cinchona is an excellent preparation which can at times be borne well, when the tincture and infusion give rise to headache. *Liquor potassæ* is often beneficial in the early periods where the secretions are unduly acid, particularly if it be combined with bark (F. 373); but it is a less favorite remedy with me than the *carbonate of ammonia* (F. 371). Dr. J. F. Churchill regards *phosphorus* in certain combinations as a specific. Without indorsing this extreme view, I am bound to say that the hypophosphites of soda and lime (F. 419) have proved of great use in some instances, particularly when the disease has been in an early stage. Whether simple alkaline remedies might not have proved equally beneficial in these cases, I cannot determine; for having once put a phthisical patient on a plan under which his symptoms are steadily ameliorated and his weight decidedly increased, I am only too glad to leave well alone. When the cough is severe, small doses of *opium* or *morphia*, frequently repeated, give relief;

especially if the soothing effect be assisted by demulcent drinks, of Iceland moss, &c. Sore lips, which irritate the patient, are to be by *lip-salve* (F. 306), or by rubbing them with the *glycerin of* covering them with *goldbeater's skin;* while aphthæ will be best painting the sore patches with the *glycerin of borax.* Where there some hæmoptysis, the *oil of turpentine* (min. x, every hour) at time it; or with greater confidence the *ammonio-sulphate of iron* (F. 116), *acid* (F. 103) may be tried; or the inhalation of fine *spray* medicated *tannic acid* (F. 262) is almost sure to be of service. Supposing the action is irritable, it may be controlled by *hydrocyanic acid* with or small doses of *digitalis,* or by the tincture of *American wild-cherry* (F. If the night-sweats weaken and annoy the patient, they will often be by *gallic acid,* or by the *mineral acids with bark,* or especially by the *of zinc* in four or five-grain doses at bedtime; or where it can be di a dose of *cod-liver oil* on port wine, taken directly after supper, fre succeeds. And then the diarrhœa, when urgent, must be stopped *catechu* (F. 97), *kino and logwood* (F. 108), the officinal *compound powder,* the *enema of opium* of the British Pharmacopœia or that 113, *vegetable charcoal* (F. 98), *subnitrate of bismuth* (F. 112), *oxide of and opium* (F. 47), &c.

Counter-irritation to the chest by dry-cupping, or the use of the cro oil liniment (F. 303), or a succession of small blisters, or frequent sinapi or turpentine stupes, or setons, or friction with the officinal iodine lini diluted with an equal proportion of tincture of aconite, often gives re In some instances, blisters kept open for weeks with savine ointment Albespeyre's plaster (F. 208) have proved useful, particularly where tubercle is near the surface, with adhesions between the pulmonary a costal pleuræ. When there is much laryngeal irritation, sponging epiglottis, back of the pharynx, and even the interior of the larynx, with strong solution of nitrate of silver, serves to ease the breathing and diminish the dysphagia; or this sponging can be supplanted by employing either an astringent or a sedative atomized fluid (F. 262) for inhalation according to the indications manifested.

And lastly, it only remains to say that I am skeptical of good arising from the administration of pancreatin and pancreatic emulsion, naphtha, malt, sulphur, and common salt. Without any doubt, however, it is believed that in tubercular phthisis nought but mischief can result from the use of arsenic, oxalic acid, phosphate of lime, oxygen gas, daily emetics, excreta of reptiles, inhalations of chlorine, Turkish baths, frequent small bleedings, antimony, mercury, and colchicum—although each remedy has found an advocate.

XXIII. CANCER OF THE LUNG.

Pulmonary cancer, more commonly of the encephaloid than any other kind, is a rare disease. It may occur either as a partial or general infiltration, or as an encysted or non-encysted nodular deposit. Primary is more common by far than secondary cancer. One or both lungs can be attacked. In the secondary form, both lungs usually suffer; in the primary kind, the right lung appears to be much more obnoxious to the disease than the left. The lung mischief is generally associated with mediastinal cancer.

When the disease occurs *primarily,* the symptoms must obviously vary

>sits in the lungs and elsewhere, the chief indication of pul-
rdiac?) mischief was that the man could not inhale chloroform
wing alarming symptoms of collapse. In the course of a month
i examination afterwards it was found that the whole penis was
soft cancerous deposit; that there was a cancerous ulcer of the
ncerous deposits in the lungs and bronchial glands, and that
ie bones were similarly affected. The heart was in a state of
;y degeneration. The patient was in St. Bartholomew's Hos-
the care of Mr. Holmes Coote.
ht of each lung in health is about 1¼ lbs., the right being rather
1 the left. In cancer, without much apparent increase in bulk,
nay rise to 5 or 6 lbs. Cancer and tubercle but rarely coexist.
ncer of the pleura is of very uncommon occurrence. Dr.
es that the mean duration of cancer of the lung may be esti-
.2 months, the longest time being 27 months, the shortest 3.5

ties of pulmonary cancer manifest a tendency to soften; they
le to destructive inflammation, ending in suppuration or gan-
>ugh the distress is great, the actual pain is not severe. Death
i asphyxia, produced by the pressure of the disease, or from
or from hemorrhage, or from suppuration and gangrene involv-
:nchyma of the lung.
ds the treatment, we can only attempt to relieve the cough,
ıtercurrent complications, and other symptoms as they arise,
r to support the strength as long as possible by nourishing food,
, and stimulants.

XXIV. PERICARDITIS.

tis [*Περὶ* = about + *καρδία* = the heart; terminal *-itis*], or in-

eighteen or twenty. The tendency to cardiac complication in rheumatism diminishes with increase of age after fifteen. Dr. Ormerod reduces all cases of pericarditis to two classes: 1. Rheumatic pericarditis; 2. Non-rheumatic pericarditis. In the first, the disease is always well-marked, it is associated with affections of the joints, women appear rather more subject to it than men, it is most common in the young and delicate, and it is rarely directly fatal. With respect to the second, the inflammation occurs at a later period of life, is most common in men, occurs most frequently in bad constitutions, and is very often the cause of death. Moreover, non-rheumatic pericarditis may be due to some local irritation, such as that set up by cancer, tubercle, incised wounds, the formation of a fistulous opening between a cavity in the lung and the pericardial sac, the extension of hepatic abscess through the diaphragm to the pericardium, &c.; or it will arise from a particular constitutional cause,—disease of the kidney, scurvy, typhoid fever, pleurisy, pneumonia, pyæmia, or one of the eruptive fevers.

Symptoms.—There is a considerable difference in the nature and degree of the symptoms; for while sometimes they are so slight that the disease escapes detection during life, in other cases they are strongly marked. When merely a slight exudation of fibrin has taken place, or when the serum thrown out has been rapidly absorbed and adhesions early effected, the patient may simply experience a feeling of fever and oppression; but where there is abundant effusion pressing upon the heart and embarrassing its movements, or where there is coexistent myocarditis, then both the local and general symptoms are rendered much more decided. Thus, in these latter instances, there will probably be high fever; pain referred to the region of the heart, often darting through to the left scapula, upwards to the left clavicle and shoulder, and down the arm; violent palpitation, the motions of the heart being tumultuous, and perceptible at a distance from the patient; irregularity of the pulse, usually with great frequency; hurried respiration; incapability of lying on the left side; strong pulsation of the carotids; anxiety of countenance; difficulty in swallowing; with, frequently, noises in the ears, giddiness, and epistaxis. As the disease advances, there is extreme debility; with a perceptible dicrotism of the radial pulse, cough, suffocative paroxysms, occasionally a tendency to syncope, and œdema of the face and extremities. The heart's action also becomes much weaker, the impulse irregular and trembling, and the sounds get weakened and altered in character. In very severe cases, indications of disturbance of the nervous centres frequently show themselves; especially great restlessness, distortion of the features, tetanic spasms, and furious delirium.

The uncertainty of the general symptoms of pericarditis makes it all the more necessary that in every instance where the occurrence of this disease is feared, the physical signs which indicate its commencement should be carefully watched for. On practicing auscultation we shall find, during the earliest stages, increased intensity of the natural sounds; while if endocarditis coexists, as it so frequently does, a loud systolic *bellows-murmur* will also be heard. Very early, too, a distinct *alternate rubbing*, or a *to-and-fro sound*, as Sir Thomas Watson terms it, will be audible. The bellows-sound indicates fibrinous deposits in the texture as well as on the surface of the valves, from inflammation of the internal membrane of the heart—the endocardium—and it generally continues for life. The to-and-fro sound is evidence of inflammation of the pericardium, and it commonly ceases in a few days, when either adhesion between the two roughened surfaces of the membrane takes place, or when effusion happens. Every now and again it will be noticed that the friction-sound continues here and

there audible, particularly about the base of the heart, though the effusion is copious. The exocardial friction-sound may so closely simulate endocardial murmur that it is sometimes difficult to distinguish between the two. Moreover, it is probable that a full development of the friction-sound can only take place when both divisions of the pericardium are the seat of plastic exudation.

Where serous effusion occurs, there will be a feebleness and deficiency of tone and force in the heart's sounds, probably owing to the deadening influence of the fluid surrounding the heart. There must also be increased dulness on percussion in the cardiac region; the dulness extending upwards to the level of the second rib, or clavicle, though but little below the healthy limits. The dull region may also change its extent from day to day. Hypertrophy of the heart, as well as serous effusion, can produce præcordial bulging; though there may be a large quantity of fluid poured out without this bulging being present. In hypertrophy of the heart, the percussion-dulness is extended in all directions, and remains stationary. In cases of effusion, also, it has been specially insisted upon that an undulatory or vermicular movement accompanies the cardiac impulse: but this motion has also been seen where no serous effusion existed—in enlargement of the heart, and in adherent pericardium. If the fluid does not become absorbed, we say that *hydropericardium* exists; a dropsical affection which sooner or later usually proves fatal. Only when the friction-sound is loud will it be sensible to the touch; since a more powerful rubbing is needed to produce a tactile than an audible phenomenon.

If we classify the physical signs of pericarditis, the arrangement will be as follows: (1.) Sensations of friction appreciable to the hand. (2.) Friction-sounds, of short duration. (3.) Extension of limit of cardiac dulness; not the consequence of œdema or congestion of the heart, but of the liquid effusion. (4.) Valvular murmurs, where the endocardium is involved. (5.) Signs of excitement or irritation of the heart. (6.) Signs of loss of power or even paralysis of the heart.

Pathology and Morbid Anatomy.—The inflammation will occasionally end in resolution. More commonly there is effusion of serum, the quantity varying from a few ounces to three or four pints. Lymph may also be extravasated with or without the serum. This lymph ofttimes forms a false membrane, covering the heart and lining the pericardial sac; the thickness of the exudation being variable, but usually measuring some two or three lines, while it often presents a peculiar irregular or honeycomb appearance. And then, in cases occurring in depressed constitutions, the inflammatory action is very likely to end in the formation of pus; these instances of suppurative pericarditis generally ending fatally.

In severe cases, the muscular walls of the heart are very often involved in the morbid action. So also endocarditis frequently arises during the course of rheumatic pericarditis. White patches of lowly organized fibrin may be found after death, effused either into or upon the tissue of the pericardium, especially that part covering the right side of the heart. They are of no importance, and are probably due to the friction arising from the cardiac movements.

The sac of the pericardium is now and then obliterated, owing to adhesions between its free surfaces; a condition which generally arises from inflammation of a chronic, rather than of an acute character, occurring for the most part in strumous subjects. Occasionally there are only partial adhesions, obliterating the sac in parts; in such instances, the adhesions being most common at the base. Adherent pericardium is not unfrequently found with a healthy condition of the heart; but when there is an alteration

in the muscular structure, the left side of the organ is by far the most frequently affected, the cavities being generally dilated, with hypertrophy of the walls. In a less number of examples of adherent pericardium, however, the heart has been found partially or entirely atrophied; this condition probably existing where the adhesions have been so thick as to compress the organ. Lastly, together with the adhesions there may be fatty degenerations of the heart's texture.

Prognosis.—Pericarditis, and especially the rheumatic variety, is not so much to be feared for its immediate danger, as for the traces of permanent injury which it leaves behind. The endocarditis that so frequently accompanies it, especially produces serious mischief to the valves of the heart. Hence an individual, after apparent recovery, seldom finds himself as strong or hearty as he was before the attack: he suffers occasionally from cough and shortness of breath, together with palpitations of the heart on moderate exertion. Sometimes the symptoms remain latent for a few years; that is to say, they are not appreciable to the patient, who flatters himself that he is free from all traces of his attack. But after a time (much shorter in those who have to work hard for their daily bread, than in the well-to-do members of society) the health begins to fail; the general weakness, difficulty of breathing, and palpitations return; dropsical symptoms set in; or perhaps an attack of inflammation takes place, and proves fatal.

Treatment.—In no disease was the lancet used with a more unsparing hand only a few years since, than in inflammation of the pericardium. More extended experience has proved to us, however, that this heroic and sure method—as it was deemed—of extinguishing the morbid action, is not only uncertain, but often very dangerous. Dr. Markham well says: "Experience has also shown us that venesection has no *directly* beneficial influence over pericarditis; and that large bleedings are prejudicial, and therefore inadmissible in this disease. Nevertheless, that small bleedings are often of very great service *in relieving the congestions of the heart and lungs*, which so often arise as consequences of and coincidently with the pericarditis, is, I think, an undoubted fact."* Then we were also taught the great importance of rapidly getting the system under the influence of mercury after bleeding; but the observations which have already been made (p. 105) upon this head render further remarks unnecessary here.

The treatment which was first advocated in the third edition of this work, published in 1857, and which I have since continued to adopt, is that practiced by many for the relief of acute rheumatism,—the three principal remedies being the bicarbonate of potash in doses of thirty grains every two or three hours, opium in sufficient quantities to relieve pain and restlessness, and the vapor-bath. Locally, poppy, and chamomile fomentations, or very hot linseed poultices, are decidedly useful. From these agents I believe that I have seen the greatest benefit; and certainly in no instance have they been prejudicial. They give considerable relief to the patient's sufferings, without inducing debility; and they in no way complicate the symptoms. The quantity of opium which may be needed, will vary with the severity of the suffering; but usually full doses (perhaps one grain every three or four hours) are wanted. Now and then a single vapor-bath suffices: in other cases it is necessary to repeat it daily, for three or four times. Alkaline drinks (F. 355, 356, 360) are also refreshing and do good. In most cases it will be necessary to administer a few doses of some purgative:

* Diseases of the Heart; their Pathology, Diagnosis, and Treatment. Second edition, p. 45. London, 1860.

the neutral salts (F. 141, 148, 150, 169) generally agree well. For pericarditis from a punctured wound, or that due to the extension of mischief from adjoining organs, any treatment beyond the administration of opium and the ordering of perfect rest, can only tend greatly to diminish the chances of recovery.

At the commencement of the attack the nourishment should be light, consisting of gruel, arrowroot, milk, and mutton broth. Directly the strength begins to fail, however, the diet must be made more strengthening; and soup, strong beef tea, and wine freely allowed. Dr. Stokes states that he is convinced patients are often lost from want of stimulation at the proper time; and he directs us to give support directly the pulse becomes feeble or intermittent, or the jugular veins appear turgid, or pallor and coldness of the surface set in, or a tendency to faint upon exertion is manifested. He says: "It may be laid down as a general principle that there is no local inflammation whatever, the mere existence of which should prevent the use of wine, if circumstances require it. In two cases especially, namely, cerebritis and pericarditis, we find the greatest timidity in practice with respect to the use of wine. Yet even in the first case it may be required; and in the second its employment is imperative, when, as too often happens, excessive depletion has been resorted to."* Absolute repose of body and mind, in all cases, is important.

When the effusion into the pericardium is abundant, a large blister should be applied over the præcordia; or a succession of smaller blisters will perhaps answer the same purpose. The iodide of potassium (F. 31) has been advantageously administered to promote absorption. It has been proposed as a forlorn hope in obstinate hydropericardium, to remove the fluid by the introduction of a trocar and canula. M. Aran, Physician to the Hôpital St. Antoine at Paris, relates a case of pericarditis with copious effusion, in a young man aged 23, which he treated by an injection of iodine. The pericardium was punctured from below upwards, with a capillary trocar, in the fifth intercostal space, a little beneath the spot where the dulness on percussion was well marked: about twenty-eight ounces of a transparent reddish serum were removed. A mixture formed of four drachms of tincture of iodine, fifteen grains of iodide of potassium, and an ounce and a half of water, was then injected without causing any pain; a drachm or two being allowed to escape before closing the wound. The fluid having reaccumulated the operation was performed a second time, at the end of twelve days, giving outlet to forty-nine ounces of a greenish-albuminous fluid; a stronger injection then being employed, formed of equal parts (fl. drs. xij) of tincture of iodine and water, with sixty grains of iodide of potassium. The treatment was successful.†

XXV. ENDOCARDITIS.

Endocarditis [from *Ἔνδον* = within + *καρδία* = the heart; terminal *-itis*], or inflammation of the whole or of a part of that delicate membrane which lines the interior of the heart and its valves, is of great interest to us as pathologists and physicians, owing to the severe organic diseases that so constantly spring from it.

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* The Diseases of the Heart and the Aorta, p. 88. Dublin, 1854.
† The Lancet, p. 407. London, April 12th, 1856.

Inflammation of the endocardium is most commonly associated with acute rheumatism. Dr. Hope was of opinion that endocarditis more frequently occurs without pericarditis, than the latter without the former. Dr. Stokes has come to a different conclusion, and he places these diseases in the following order of frequency: 1. Acute pericarditis with endocarditis; 2. Acute pericarditis without endocarditis; and 3. Endocarditis without pericarditis. It is certain, however, that *endopericarditis* is more frequently met with than simple endocarditis.

Symptoms.—In very severe instances the inflammation chiefly gives rise to a sense of oppression and uneasiness at the præcordial region; while the patient prefers to lie on his back, and is restless and anxious. There will be fever, with a small and feeble and intermittent pulse; while there may be also cold sweats, oppressive dyspnœa, jactitation, and syncope. Where the unhealthy process is only of limited extent, or when it assumes a chronic form, the symptoms are much milder and more obscure; so that it not very unfrequently occurs during the progress of rheumatic fever without being recognized. Nevertheless, the power of the disease is manifested by the structural changes which remain after apparent recovery. Endocarditis of the left is much more common than of the right side of the heart; while that part of the membrane which covers the valves and lines the orifices is most prone to become affected. The disease is seldom directly fatal; its remote effects being those so much to be dreaded.

Diagnosis.—Upon applying the hand to the chest in simple endocarditis, the action of the heart may appear to be violent; while sometimes a vibratory thrill will be felt. The patient himself may complain of the palpitations and irregular action, and feel alarmed. But it must be recollected that the inflammation may be progressing without causing pain, or any disturbance appreciable to the sufferer; while, on the other hand, these symptoms occasionally arise from simple irritability of the heart.

Percussion, it is said, often discovers an augmented extent of dulness in the præcordial region; this dulness being distinguished from that caused by pericardial effusion by the beat of the heart appearing superficial instead of remote and distinct. But it is very doubtful if simple endocarditis can ever give rise to so much tumefaction or congestion of the walls of the heart as to produce such an increased degree or extent of dulness as could be appreciated on making the usual examination.

Auscultation alone affords us any reliable information. On listening to the heart's sounds we shall usually detect a soft bellows-murmur, the most constant and characteristic of the phenomena of endocarditis. It is not always easy, however, where pericarditis exists, to distinguish between an exocardial and an endocardial sound; while when it is certain that a valvular murmur is present, it may be perplexing to determine whether this is the consequence of old or recent mischief. Supposing that during the progress of an attack of rheumatism a murmur is found where none existed before, we of course cannot be wrong in diagnosing endocarditis; while we may with equal certainty infer that some fibrinous exudation into and upon the delicate lips of a valve has caused misshapement. If this exudation get indurated, it obstructs the orifice; if it weaken and pucker the valve, there will be regurgitation. When the murmur proves to be systolic, most distinct at the base and along the course of the aorta, and accompanied with a small pulse, it is significant of *aortic obstruction;* if systolic, most distinct at the apex, and with an irregular pulse, it is due to *mitral regurgitant disease.* A diastolic murmur, most distinct from the centre of the sternum (on a level with the third intercostal space) upwards towards the base, with a jerking pulse, is indicative of *aortic regurgitation;* while a

diastolic murmur, most distinct from the fourth left intercostal space downward towards the apex, with an irregular small pulse, is the result of *mitral obstruction*. The murmurs of purely acute endocarditis are thus arranged in order of frequency by Dr. Walshe:* Aortic obstructive; mitral regurgitant; aortic regurgitant; aortic obstructive and mitral regurgitant together; aortic obstructive and regurgitant together. Pulmonary systolic and diastolic murmurs are infinitely rare. Dr. Walshe has never observed acute obstructive mitral murmur, nor acute regurgitant tricuspid murmur.

To recapitulate, the questions to be decided by auscultation are these: Is the abnormal sound exocardial or endocardial? If the latter, is the murmur old or recent? Allowing it to be recent, is it aortic or mitral; or is there a double bruit owing to the valves at both orifices being affected? Primary disease of the pulmonic and tricuspid valves is so very rare, that the consideration of such need not here be allowed to complicate the points for scrutiny. Then, finally, is it obstructive or regurgitant disease; or aortic obstructive and mitral regurgitant together; or aortic obstructive and regurgitant together?

For the further consideration of the physical signs, see the section on *Diseases of the Valves of the Heart.*

Terminations.—The terminations of acute endocarditis are permanent valvular disease, with implication of the heart's substance, and all their combined consequences. Persistent valvular disease leads to dilatation of the cavities; the system loses tone, and the blood becomes impoverished; while after a variable interval dropsy sets in. Thenceforth the progress towards a fatal termination is rapid, life rarely being prolonged beyond fifteen months from the occurrence of dropsy.

When fibrinous deposits have taken place upon the valves, portions of the exudations may become detached and circulate with the systemic blood until they get arrested in some artery where they act as a plug, and so cut off the supply of blood to the part (see p. 55). Temporary paralysis is not very rare in heart disease, and may arise from an embolus carried upwards in this manner; the power being restored if the collateral circulation is able afterwards to afford a due supply of blood, or if the mass of fibrin should soften and break up so that the vessel once more becomes permeable.

Sometimes the fibrinous deposit sets up great irritation in the tissue of the valves; and then ulceration may take place, producing perforation or a ragged condition of the edges. The disorganizing process will even extend to the chordæ tendineæ, breaking them down and rendering them useless. Dr. Ogle has given an account of twenty-one cases of ulceration of the valves, which occurred in St. George's Hospital.† The report is very instructive, and deserves a careful perusal.

Treatment.—This must be conducted on the same principles as should guide the practitioner in the treatment of pericarditis. Owing, however, to the power of ammonia in preventing deposition of fibrin, it is very advisable to administer full doses of the carbonate or the aromatic spirit of this salt, from the commencement of the inflammation.

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* The Diseases of the Heart and Great Vessels, including the Principles of Physical Diagnosis. Third edition, p. 248. London, 1862.

† Transactions of the Pathological Society of London. Vol. ix, pp. 131–153. London, 1858.

XXVI. MYOCARDITIS.

Myocarditis [from *Μῦς* = a muscle + *καρδία* = the heart, terminal *-itis*], carditis, or inflammation of the muscular substance of the heart, seldom occurs as a distinct affection, being generally (if not always) combined with pericarditis, or with endocarditis, or with both. The morbid action, it is probable, extends from the investing or the lining membrane to the muscular substance, though our present knowledge will not justify our denying that the starting-point of the inflammation may be in the muscular fibres themselves. The walls of the left ventricle seem to suffer more frequently than other parts of the heart. The results of myocarditis are induration of the muscular structure in consequence of the deposit of lymph, the formation of abscesses, aneurismal dilatation of the walls of the heart, and perhaps rupture.

Dr. Latham met with an almost unique case of universal carditis, in which there was effusion of pus generally throughout the cardiac fibres. The whole heart, on being opened, was seen to be deeply tinged with dark-colored blood, while its substance was softened. Here and there, upon section of both ventricles, innumerable small points of pus oozed from among the muscular fibres. This was the result of most rapid and severe inflammation, death having occurred after an illness of only two days.

The report of another notable instance of inflammation of the muscular substance of the heart has been published by Mr. Salter.* In this case the disease ran its course in seven weeks. It commenced with an acute pain in the left side of the chest, which came on when the patient was walking, lasted a short time, and recurred about a week afterwards whilst he was using the same exercise. The pain subsequently became very frequent, and was induced by the slightest exertion. When Mr. Salter first saw him about a week before his death, there was orthopnœa and an uneasy sensation or dull aching referred to the stomach and middle of the sternum. Venesection, calomel, and opium, with counter-irritation, were the means adopted to stay the disease; but they were unavailing, and death took place. At the *post-mortem examination* the pericardium was found inflamed, especially in its diaphragmatic portion; its vessels were distended, and spots of ecchymosis were discovered beneath the serous membrane. The substance of the heart was moderately firm, but the left ventricle had almost entirely lost the color of muscle, pus could be scraped from its surface, and in some parts there were cavities in the muscular substance like small abscesses.

The history of an example of acute inflammation of the muscular structure of the heart, without any inflammation of the endocardium or pericardium, was detailed to the Fellows of the Royal Medico-Chirurgical Society by Dr. C. B. Radcliffe in 1865. The patient was a strong middle-aged man, a varnish-maker by occupation. For six weeks he had suffered occasional attacks of sharp pains at the pit of the stomach, shooting thence into the left arm—attacks evidently of the nature of angina pectoris. He was well enough to follow his daily work, and to get about with little or no discomfort up to the day before his death. When first seen (July 27th, 1865), the indications pointed to a very weak heart. The pulse was extremely feeble and somewhat slow but not irregular, hands cold and clammy, first sound of the heart absent, cardiac impulse against the walls of chest could not be felt, while the second sound of the heart could be only faintly heard, and several times was distinctly reduplicated. There were no

* Medico-Chirurgical Transactions. Vol. xxii, p. 72. London, 1839.

morbid sounds of any kind. In the attempt to detect the cardiac impulse the patient winced and complained of feeling sore at the part. On the following day he was dying. Sitting awkwardly upon the edge of a chair by the side of the bed, supported by his wife, he gasped out, "I must keep as I am, I dare not stir." He had been in this uncomfortable position for ten or twelve hours. His face was pale and ghastly, large beads of sweat stood out on the forehead, while his extremities were clammy, and pale, and cold. The pulse had failed, the breathing was shallow and gasping and attended with a rattle, of which the significance could not be mistaken. His mind was clear and collected, he complained of sickness, and said he knew that he was dying. At the *autopsy*, twenty-four hours after death, the heart was found dilated and flabby. The muscular structure of both ventricles, and in a lesser degree of both auricles, was soft and friable, and almost black. It broke down readily under the finger like hepatized lung. As seen with the naked eye, it did not appear to be fatty, but there were considerable deposits of fat about the exterior of the heart. The pericardium, endocardium, and all the valves, were quite healthy, and so also was the aorta. The left ventricle contained some loose and dark clots of semi-coagulated blood; in the right ventricle were some fibrinous but not discolorized clots adherent to the walls. Upon lifting up the heart by a portion of the right ventricle, the muscular structure broke down, and tore like wet paper by the weight of the heart itself. Unfortunately no microscopic examination was practicable.

There seems to be some reason for believing that the muscles of the heart may occasionally be affected with rheumatic inflammation, causing sudden paralysis of the organ and death. This occurrence will possibly explain those cases of acute rheumatism, where patients have been suddenly seized with severe pain in the cardiac region, suffocative dyspnœa, insensibility, convulsions, and death; and where afterwards no appearances have been detected, on a careful examination of the body, to account for the abrupt invasion of the fatal symptoms. It must not be overlooked, however, that possibly in some of these cases the fatal event may have been due to the formation of a coagulum in one of the large arteries.

XXVII. VALVULAR DISEASES OF THE HEART.

A few words on the normal sounds of the heart may not be out of place, before speaking of the valvular diseases of this organ. On practicing auscultation over the cardiac region we can detect two sounds, very quickly following each other. They are succeeded by an appreciable period of silence. If the time occupied by the sounds and the pause be divided into fifths, we shall find the first sound occupying two-fifths, the second sound rather more than one-fifth, and the pause rather less than two-fifths. The *first sound*, sometimes called the systolic or inferior sound of the heart, should be listened to over the apex: it is dull, booming, and prolonged; and is coincident with the systole [*Συστέλλω* = to contract] of the ventricles, pulse of the arteries, diastole [*Διαστέλλω* = to dilate] of the auricles, and impulse of the apex against the thoracic parietes. The *second sound*, often termed the diastolic or superior sound, is best heard about the middle of the sternum; it is short, abrupt, and clear; and is synchronous with the

passive flow of blood from the auricles into the ventricles, the diastole of the ventricles, and the retrocession of the apex.

All physiologists agree in regarding the *second sound* of the heart as due to the brisk tension of the semilunar valves at the orifices of the aorta and pulmonary artery. The cause of the *first sound*, however, has long afforded a subject for controversy. By different eminent authorities it has been said to be due, entirely or partially, to the following: The collision of the particles of blood with each other, and with the heart's parietes. The rush of blood through the narrowed openings of the great arteries. The impulse of the heart's apex against the thoracic walls. And the muscular bruit, produced by the contraction of the muscular fibres of the heart.

Now Dr. Halford believes that he has solved this delicate problem; for he says his experiments demonstrate the fact that both sounds "depend upon the same cause, which is simply the vibration of the valves, produced by the backward pressure of the blood, first against the auriculo-ventricular, and secondly against the ventriculo-arterial valves." It may be questioned, however, whether this explanation is altogether satisfactory; and whether the experiment by which he supports it, viz., exposing the heart of a living animal, and completely arresting the flow of blood through it, is not liable to mislead the student. For it is clear that if the circulation through the heart be arrested, none of the supposed causes of the first sound can act; there can then be no rush of blood through the arterial orifices, no impulse against the thoracic walls, no collision of the particles of blood with each other. I do not say that Dr. Halford's view is incorrect, because the more it is considered the more I am inclined to adopt it; but I simply feel that the way he attempts to prove it is not convincing. Dr. Halford does not pretend to have originated this valvular theory, but to have finally confirmed it. In 1832 Dr. Billing taught that, "the first sound is caused by the tension produced in shutting the auriculo-ventricular valves, and the second sound is caused by the tension produced in the shutting of the ventriculo-arterial valves." Putting together the evidence of Drs. Billing, Halford, Rouanet, Bryan, and others, it seems impossible to deny that the closure of the auriculo-ventricular valves is an important element in producing this first sound; while it seems almost overskeptical to doubt that it is the sole cause.

Causes and Effects of Valvular Disease.—Most of the alterations in the internal lining membrane of the heart result from inflammation, which gives rise to a deposit of lymph upon and beneath the serous membrane. The valves thus lose their beautiful thinness and transparency: they become thick and indurated, or puckered up, or adherent to each other or to the opposite walls of the channel. Independently of inflammation, the valves sometimes become covered with warty vegetation or excrescences, or they may be injured and lacerated, or they can be rendered inefficient by simple dilatation of the orifices which they guard, or they are found to be the seat of atheromatous or calcareous degeneration.

The *effects* are twofold: either to contract and narrow the orifice and so obstruct the passage of the blood—*valvular obstruction;* or by puckering and shortening the valves, to make the orifice more or less patent, and hence permit a regurgitation of blood—*valvular insufficiency, regurgitant disease of valves,* &c. There may be only valvular obstruction or valvular insufficiency in any given case; but often these conditions coexist.

Diagnosis.—In the diagnosis of the diseases under consideration attention must be directed, firstly, to the physical signs; and secondly, to the chief functional symptoms.

1. The Physical Signs.—Physicians in all ages have very properly

attached considerable importance to the rate and force at which the circulation is carried on. As a measure of these conditions, as well as of the quantity of blood sent forth at each contraction of the heart, appeal is usually made to the *pulse* as felt by the finger placed over the radial artery, at the wrist. Now the pulse of the adult in health beats about 75 times in a minute, and some considerable practice is needed to enable the observer to appreciate the characters of each of these pulsations. But if this be true, how much more difficult must it be in disease, with a pulsation frequently occupying less than half a second. To remove this difficulty recourse has been had to mechanical appliances. Vierordt was the first physiologist to invent an instrument capable of conveying the impulse from an artery to a lever which should mark the movement on a revolving cylinder of paper. This instrument is called a *sphygmograph*. The traces made by it are regular; and mark the extremes of dilatation and the number of pulsations in a given time. The misfortune is that its application is difficult. Hence, endeavors were made to produce a piece of mechanism which could be easily used, and which should produce a trace representing the shades of dilatation and contraction of the vessels. M. Marey has supplied this want; and his sphygmograph, substantially the one now used, accurately and minutely records the movements of an elastic steel pad pressed upon the artery. By this instrument, placed upon the arm over the radial artery, a trace can be procured on paper showing the form, and duration, and regularity of the pulsations. On examining such a pulse-tracing it will be found to consist of a series of curves, each of which corresponds to that succession of events which forms a cardiac revolution, and which is known as a beat or pulsation. Every pulsation is said to be composed of a line of ascent, a summit, and a line of descent. When the ventricles contract, all the arteries suddenly expand, while a wave movement is propagated along the arterial system; this movement probably producing the line of *ascent*. The more rapid the entry of blood into the arteries, the more vertical will be the ascent of the lever of the sphygmograph. The *summit* of the pulsation corresponds with the period when the afflux of blood into the artery and the efflux are equal. This period may be so brief that the summit of the curve is only a point, or it may be more or less blunt, as happens when the heart is weak. The line of *descent*, the most important portion of the curve, is coeval with the diminution of arterial pressure. It is coincident with the time which intervenes between the closure of the semilunar valves of the aorta and the next ventricular systole. This line varies in its obliquity in different cases; but it is likewise peculiar in being broken by two undulations or notches, showing that the pulse in health is registered as tricotous, instead of dicrotous as taught by Marey and those of his followers who thought there was only a single undulation. The first undulation occurring soon after the summit of the curve is called by Wolff the first incisure; the elevation which succeeds being the first secondary wave or undulation. The dicrotism of Marey is the great ascension; the notch (probably to be known for the future as the aortic notch, since it is synchronous with the reflux of blood closing the aortic valves) which precedes and separates it from the first secondary wave being the great incisure. At the bottom of this great incisure there can sometimes be seen a slight undulation, known as the second secondary wave.

The diagnosis of organic disease of the heart by auscultation and percussion is so comparatively simple and easy that any further physical means of investigation may be deemed unnecessary. We cannot afford, however, to dismiss any aids to the investigation of disease; and hence it has been considered advisable to direct attention in the foregoing manner to the uses

of the sphygmograph. The few results which have been so far obtained by it in disorders of the circulation will be noticed presently, as well as subsequently when speaking of aortic aneurisms. The value of this instrument in fever has been already (p. 201) described.

The average frequency of *respiration* in health, in a state of mental and bodily rest, is 18 in the minute, in the adult; taking the pulse at somewhere between 72 and 80. This ratio is not only easily disturbed by disease, but also by mental emotion and other agents. To show the extent to which the pulse-respiration ratio is altered in disease, cases of fatty degeneration of the heart may be instanced. Thus, in this condition the ratio will often be as 1 : 2, with such numbers as $\frac{18}{36}$, or $\frac{20}{40}$. In most forms of embarrassed cardiac action the respirations are unduly frequent. The difficulty of breathing varies from the slightest dyspnœa to the most severe orthopnœa. Often it is the principal source of suffering, preventing the sufferer from lying down, and giving rise to most restless nights. In cases of heart disease where the victim is able to pursue his ordinary avocations to a certain extent, any undue exertion will often produce an attack of dyspnœa. This, however, is seldom noisy, as it is when the bronchi or pneumogastrics are pressed upon or irritated by an aortic aneurism.

The natural *sounds of the heart* are liable to be modified and changed by disease, causing either sound or both to be accompanied or to be supplanted by a noise which has been aptly compared to the blowing of a pair of bellows: hence it is termed by us a *bellows-murmur*, and by the French a *bruit de soufflet*. A bellows-murmur may be harsh, or rough, or cooing, or whistling, or musical; but these modifications are of little importance. For of whatever nature, the important point to remember is, that this bruit is caused either by the presence of obstructions (the consequence of disease or malformation) which impede or break the free current of blood through the heart and its great vessels—producing an *organic* murmur; or else it is occasioned by a change in the composition of the blood, or a clot in one of the heart's cavities—giving rise to an *inorganic*, or *functional*, or *hæmic* murmur. Where the valves of the heart are affected so that they act ineffectively, an organic bellows-murmur must result.

The arteries may also become the seat of murmurs. When the calibre of a vessel is much increased so that the direction of the blood-current is altered, or when the capacity is diminished so that there is increased friction of the blood against the coats; when the coats of the artery are diseased, with or without aneurism; and when there is some direct communication between an artery and a vein,—in all these cases an *organic* murmur results. An *inorganic* murmur is due either to altered composition of the blood, or to the formation of a clot in the vessel.

During the early stage of phthisis, a murmur (which, strictly speaking, can neither be referred to the organic nor inorganic class just described) may sometimes be detected under the left clavicle, owing probably (as before mentioned) to the pressure of the tubercles under the left subclavian artery; while not uncommonly a systolic bellows-sound is heard in the second left intercostal space over the pulmonary artery, the heart and the pulmonary artery being quite healthy. Moreover, displacement of the heart, owing to the pressure of pleuritic effusion, ascites, &c., may give rise to a loud murmur which does not disappear until the organ is restored to its natural position, by the removal of the fluid; though it must be confessed that a bruit under these circumstances is a rare event, for I have frequently looked in vain for it when the heart has been pushed considerably upwards by the presence of an ovarian tumor, or by pregnancy advanced to the full term.

The loudness and distinctness of organic cardiac murmurs are not proportionate to the extent of disease causing them, for sometimes an exceedingly small vegetation on one of the valves will produce a very loud murmur. Dr. C. J. B. Williams had a man, thirty years old, under his care, in whom there was a very loud murmur following the second sound; which murmur, though most distinct in the mid-sternum, was also heard in every part of the chest, in the arteries of the neck, and even slightly in the radial. The man caught typhus fever, from which he died; and at the post-mortem examination it was found that the valves were all healthy except the aortic, while in these the only change was that one of them had the free margin neatly retroverted so as to leave a small smooth chink for regurgitation. The ventricles were also moderately enlarged and thickened.

The lining membrane, valves, and orifices of the left side of the heart are much more frequently diseased than those of the right; so much so, that it is almost a question whether disease of the tricuspid or pulmonary valves can be accurately diagnosed. "Practically, in at least nineteen out of twenty cases," says Dr. Harvey, "the questions to be determined are, whether it be the mitral or the aortic valve that is diseased, or both; and whether the disease be of the nature of valvular obstruction, or of valvular insufficiency, or both."* Diseases of the left side chiefly affect the arterial pulse, giving rise to irregularity and inequality; those of the right side affect the venous circulation, causing regurgitation into the jugular veins—a condition known as the venous pulse. Dropsy is more often connected with disease of the right than of the left cavities.

Disease of the *semilunar valves of the aorta* is not uncommon. When of sufficient duration, it will be found to have produced hypertrophy of the left ventricle; which hypertrophy may compensate for the obstruction or regurgitation caused by the aortic disease. Thus, the systemic circulation may be uninterfered with. Supposing that the affected valves diminish the aortic orifice during systole (or contraction) so as to prevent the blood from freely flowing out of the ventricle, a systolic bellows-sound will result. This can be best heard at the base of the heart, along the course of the thoracic aorta, up towards the right clavicle, and even in the carotids; the sound diminishing as the stethoscope is moved towards the apex of the heart. If the valves close imperfectly, permitting reflux of blood from the aorta, the morbid sound will be diastolic—will accompany the dilatation of the ventricle. The short, second sound of the heart will also be muffled and indistinct. Sometimes we have both these conditions of the aortic valves in the same case—aortic obstructive and regurgitant together; a double bruit or bellows-sound being then produced. The pulse of aortic disease is regular: in the regurgitant form it is often peculiar, being generally sudden and sharp, and without any prolonged swell of the artery; Dr. Hope calls it a jerking pulse. The sphygmographic traces of such a pulse are said to show certain peculiarities. There is a great amplitude of trace. The line of ascent is vertical. The curve usually presents a pointed summit. This vertical line of ascension and pointed summit are not peculiar, however, to aortic regurgitation; similar appearances being produced in functional disturbance from anæmia. But when the valvular incompetency is so great that there is free regurgitation, the descending line of the curve shows a sudden fall with an absence of dicrotism; the aortic notch being more or less suppressed, since the closure of the aortic valves which produces it is imperfect.

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* "Notes on Chronic Heart Disease." Association Medical Journal, p. 785. September 1st, 1854.

The *mitral valve* which guards the left auriculo-ventricular orifice, may become thickened or ossified; the effect of which is to prevent its closing the auricular orifice during systole, as well as to hinder its lying flat against the walls of the ventricle so as to allow the blood to pass freely out during the diastole. In such cases the orifice is almost rendered a permanent oval slit. A double bruit may perhaps be detected: the first, systolic, caused by the regurgitation of the blood from the ventricle into the auricle; the second, diastolic, and due to the impediment to the passage of the blood from the auricle to the ventricle. Such a double bruit is but rarely heard, however. The murmur or murmurs can be best distinguished towards the apex of the heart, on the left. Although mitral murmurs are often inaudible at the base of the heart, yet they can frequently be heard clearly behind—at the lower angle of the left scapula. The pulse is irregular, and usually soft and frequent: the irregularity is clearly registered by the sphygmograph. Palpation also often discovers a purring thrill. Mitral disease, whether obstructive or regurgitant, interferes with the pulmonary circulation; all the vessels concerned in which get enlarged, the lungs are constantly overloaded with blood as the circulation through them is sluggish, and hence there is lividity with a tendency to hemorrhage into the air-sacs. The right ventricle becomes hypertrophied and ultimately dilated; and sooner or later there will be a condition of stasis in the systemic veins, persistent congestion of the liver and often of the kidneys, with jaundice and dropsy and albuminuria.

Following the plan of Dr. Harvey, the signs of disease of the aortic and mitral valves may be thus briefly tabulated:

BRUIT: If *systolic*, and loudest at
Base = AORTIC *obstruction*.
Apex = MITRAL *insufficiency*.
BRUIT: If *diastolic* and loudest at
Base = AORTIC *insufficiency*.
Apex = MITRAL *obstruction*.
PULSE: If *regular*, Full or strong, Jerking, resilient, } = AORTIC disease.
PULSE: If *irregular*, Intermittent, unequal, Soft, small, weak, } = MITRAL disease.

The *semilunar valves of the pulmonary artery* are very rarely diseased; so rarely that any organic alteration in them is a pathological curiosity. When, however, a bellows-murmur can be traced from the middle of the left edge of the sternum up towards the left clavicle, and when this murmur cannot be heard in the subclavian or carotid arteries, we may assume that it originates at the orifice of the pulmonary artery. The pulse remains unaltered.

The *tricuspid valve*, guarding the right auriculo-ventricular opening, is also but seldom found otherwise than healthy. When diseased, the morbid condition will almost invariably exist in combination with aortic or mitral affection, or with both. In dilatation of the right ventricle from mitral incompetency there may be tricuspid regurgitation without change of structure. In such cases there may, or may not, be tricuspid murmur, occurring with that of mitral obstruction or regurgitation. Turgescence, with pulsation of the jugular veins at every ventricular systole is present in those cases of tricuspid disease dependent on dilated right heart. But

whether the venous pulse is a symptom of tricuspid regurgitation is at least doubtful.

To determine the systolic or diastolic character of a murmur, the pulse at the wrist should be carefully noted during auscultation; if systolic, the bruit must of course be synchronous with the pulse, and if most audible at the apex, is indicative of mitral disease; if diastolic, not synchronous with the pulse, and most audible over the centre of the sternum and along the course of the aorta, it is indicative of aortic disease.

Inorganic or *functional murmurs* generally counterfeit aortic or pulmonic bruits as regards their position. A murmur which is best heard over the base of the heart and the great arteries, which is single and systolic, which is accompanied by an anæmic murmur in the neck, which varies in intensity under different states of the system, and which is not attended by a turgid condition of the vessels,—such may be set down as a functional bruit.

2. The Functional Symptoms.—The following are the chief results of valvular disease:

a. Palpitation and irregular action of the heart appreciable to the patient. *b.* Congestion of the lungs; bronchitis; pneumonia; and pulmonary hemorrhage, with or without pulmonary apoplexy. These symptoms are most urgent in mitral disease. *c.* Hemorrhages from the nose, bronchial tubes, or mucous membrane of the stomach. *d.* Œdema of the lower and sometimes of the upper extremities, and face; hydrothorax; and ascites. Dropsy is more common in disease of the right cavities of the heart than in affections of the left. *e.* Cephalalgia, tinnitus aurium, vertigo, syncope, cerebral congestion, and cerebral hemorrhage. These consequences are most urgent in aortic disease. *f.* Broken rest, with startings during sleep, and frightful dreams: the latter often so bad, that the patient will ask an attendant to keep him awake. *g.* Enlargement of the liver and spleen, with disorder of the digestive organs generally. *h.* A peculiar and almost characteristic appearance of the countenance,—*i. e.*, the face is puffed, the cheeks are flushed and of a purple hue, the lips are congested, and the eyes are bright.

While time advances, the heart disease commonly becomes more aggravated. As certain of the functional symptoms are developed, the patient gets weak and nervous. He suffers immediately from overexertion, mental emotion, improper food, or exposure to wet and cold; and subsequently death ensues,—either suddenly from syncope, or gradually from exhaustion aggravated by sleeplessness, or from the progress of one or other of the secondary affections. The latter termination is decidedly the most common.

Prognosis.—The danger of structural cardiac disease will be in proportion to the extent to which the change impairs the power of the heart in carrying on the circulation; as well as partly in proportion to the degree to which the blood is deteriorated in quality. So long as the natural sounds are distinct, and the impulse of the apex is not felt beyond its natural limits, there is no present danger (provided there be no great amount of anæmia) however loud or harsh the accompanying murmurs happen to be; while even if the general symptoms be distressing, we may entertain very sanguine expectations of relieving them to such an extent that moderate health may be regained. Whether the improvement will persist for any length of time, must of course depend upon the fact of the valvular lesion becoming stationary or aggravated; for it may so increase, from many causes, as to develop dangerous disorder. But if the history of the case is not that of a sudden or recent attack, and if the physical signs do not grow more marked in the course of a few weeks, a favorable prognosis can be given, and hopes encouraged of some years of comfort.

On the contrary, if the natural sounds are indistinct, or are nearly superseded by abnormal murmurs, then it must be inferred that the heart's power for action is much impaired, and that there exists serious ground for alarm. In such cases, too, the general symptoms usually plainly indicate that the chief organ of the circulation is failing in its work: for there are distressing palpitations with irregular action, frequent attacks of syncope, and congestions of internal organs and tissues. Dropsy is also likely to set in. Those cases are especially dangerous where the valvular lesion is due to some violent exertion, or where the structural change has been aggravated by a second assault of endocarditis, or by the setting in of fatty degeneration and consequent softening. When to the above symptoms there is superadded a thin watery state of the blood, the cause for alarm is proportionately increased, as is also the case when the blood is poisoned by urea, bile, lithic acid, &c.

Treatment.—In the treatment of the valvular diseases of the heart three indications have generally to be followed: (1) To abate inordinate action of the heart by tonics and sedatives—as digitalis, the American wild cherry, hydrocyanic acid, aconite, belladonna, conium, henbane, hop, and morphia; though these remedies, and especially the last, must be employed with great caution, for where there is a feeble pulse, dyspnœa, and difficult expectoration, a dose of opium may but materially hasten death. (2) To ward off or gradually relieve the results of the cardiac disease, such as pulmonary congestion, pneumonia, hemorrhage, congestion of the liver and kidneys, dropsy, &c. This is to be attempted by ordering a nutritious diet, and by maintaining the various secreting organs in a healthy state; saline purgatives and diuretics, repeated at proper intervals, being very valuable. When the dropsical effusion is great in these instances, much benefit may often be derived from mercury; diuretics, which had previously been useless, often causing an astonishing flow of urine directly the gums get touched. The latter effect, however, is frequently obtained with difficulty where the obstruction to the circulation is great. In anasarca of the lower extremities, small incisions along the legs give great relief by allowing the serum to drain off; the chilly and moist uncomfortable feelings caused by the flow of fluid being best mitigated by wrapping the limbs in soft chamois leather. And then (3) we must endeavor to give strength and tone to the heart, so as to assist it to do its work. There will be most hope of accomplishing this by nourishing food, perhaps cod-liver oil, a duly regulated supply of stimulants, breathing pure air, warm clothing, early hours, cold or tepid salt-water sponge baths, avoidance of all bodily and mental excitement, and by the administration of tonics—especially one of the various preparations of steel.

XXVIII. HYPERTROPHY OF THE HEART.

The heart is stated roughly to be about the same size as the closed fist. The average weight of this organ in the adult male may be said to be nine and a half ounces, that of the female being eight and a half.* After the

* The weight of the healthy heart in persons from twenty to fifty-five years of age averages in males 9 oz. 8 dr., and in females 8 oz. 13 dr. Estimates of this description are, of course, to a certain extent arbitrary; for as the heart is found, in some cases, to be considerably above its ordinary weight, without the proportion

age of sixty the heart is somewhat heavier, since the thickness of the walls of the left ventricle has then become decidedly increased. The muscular parietes of one or more of the cavities may become thickened without any diminution in the size of the chamber: this is called *simple hypertrophy*. Or, as most frequently happens, the walls will be thickened and the chamber become larger than natural; this is *eccentric hypertrophy*, or *hypertrophy with dilatation*. On the other hand, the increase in thickness may be accompanied with diminution in the size of the cavity, a condition known as *concentric hypertrophy*. This last form is now believed only to occur as a congenital malformation, and never as the consequence of disease.

The *cause* of the hypertrophy is usually some obstruction either to the flow of blood through the heart, or to the free play of this organ, whence the amplification is frequently a compensatory provision to counterbalance the impediment. The heart is stimulated to extra exertion, and in consequence it receives an extra supply of nutritive materials, by which its muscular structure is strengthened. The left ventricle is more frequently found hypertrophied than the right, and much more so than the auricles. In a heart which weighed five pounds, the walls of the left ventricle had acquired a thickness of two inches. Hypertrophy with dilatation of the right ventricle is commonly due to some chronic disease of the lungs obstructing the circulation. Conversely, it has been thought that hypertrophy of the right ventricle might be an occasional cause of the extravasation of blood into the pulmonary structure, possibly by urging the blood onwards with too much force.

The *symptoms* will depend upon the extent of the hypertrophy. Frequently they consist of palpitation, dyspnœa, difficulty of walking quickly, uneasiness and pain in the cardiac region, headache, and repeated attacks of vertigo. If we listen to the heart's movements, the systolic sound will be found less distinct than in health; but we shall also feel that the extent of the pulsation beyond the præcordial region, and especially the degree of impulse against the walls of the chest, are both much increased. Moreover, when there is valvular disease, the morbid sounds indicative of such will be present.

The *treatment* must consist in keeping the patient as free from undue excitement as possible, and in prescribing for his symptoms. If there be much debility, quinine or steel, or both (F. 380, 394, 405), bark (F. 371, 376), or the mineral acids (F. 377, 378) had better be given; if the heart's impulse be very great, aconite (F. 330), or digitalis (F. 334), or the American wild cherry (F. 333), can be occasionally, but cautiously, tried; while when the dyspnœa is urgent, stimulants, especially ammonia and spirit of ether (F. 361, 367), may be had recourse to. The chief point to be kept in view is this: that while the effects of the hypertrophy on the circulation are frequently favorable, yet too great force might possibly lead to pulmonary (or even to cerebral) apoplexy.

SIMPLE HYPERTROPHY OF THE LEFT VENTRICLE WITH NO OBSTRUCTION TO THE FLOW OF BLOOD.—This condition is rare. On ausculting the heart the systolic sound is less loud and clear than natural, but no bellows-murmur can be heard. On placing the hand over the præcordial region, the impulse of the heart will be felt increased.

In many cases of chronic Bright's disease there is found hypertrophy of

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of its walls and cavities being materially altered, or the organ being otherwise diseased, it is not easy to say at what point it ceases to be healthy. Dr. Peacock: Monthly Journal of Medical Science, vol. xix, p. 211. Edinburgh, 1854.

the heart—especially of the left ventricle—without any disease of the valves or large bloodvessels existing to retard the flow of blood, and thus to explain the increased bulk of the muscular walls. In these cases it is supposed that the blood is impeded in its passage through the minute systemic vessels owing to its contamination by excrementitious materials in consequence of the renal degeneration; and hence the left ventricle has to make extraordinary efforts to propel the blood, and, of course, acquires increased bulk and strength.

HYPERTROPHY OF LEFT VENTRICLE WITH VALVULAR DISEASE.—This is the most common form of hypertrophy. The chief causes, according to Dr. Markham, are: "Defective aortic valves, permitting regurgitation of the blood into the left ventricle during its diastole; constriction of the aortic orifice, impeding the free passage of the blood from the left ventricle during its systole; deficiency of the aortic valves, associated with constriction of the aortic orifice; defective mitral valves, permitting regurgitation of the blood from the left ventricle into the left auricle: all these abnormal conditions occasion impediments to the circulation of the blood through the heart, and their immediate effects are, for the most part, communicated directly to the left side, and indirectly to the right side of the heart."* As the hypertrophy in these cases is an endeavor (so to speak) towards health, the increased power compensating for the obstruction to the flow of blood caused by the valvular disease, we must not unnecessarily interfere with the symptoms.

DILATATION OF THE HEART.—This may occur under three circumstances. First, there may be, as has been just shown, hypertrophy with dilatation; such a condition being known as *active dilatation*, when the expansion predominates over the hypertrophy. Secondly, we have *simple dilatation*, where the thickness of the walls is normal. And thirdly, there is *passive* or *attenuated dilatation*, the walls being thinned. This last is the only state which demands a few words.

Passive dilatation is often combined with malnutrition of the heart, and fatty degeneration of the muscular fibres; both ventricles are usually affected, though the right may be so in a more marked degree than the left; and the attenuation will, perhaps, be so extreme that the walls are found quite collapsed after death. Passive dilatation may be due to some exhausting disease, or to inflammation of the endocardium, or perhaps to pericardial adhesion. The chief symptoms are a small, weak, and perhaps irregular pulse; coldness and slight lividity of the extremities; with giddiness, and derangement of the digestive organs. There is a tendency to congestion of the liver, to imperfect action of the kidneys, and also to congestion of the lungs. Moreover, the patient is restless at night, gets weak and irritable, and suffers from asthmatic paroxysms (cardiac asthma): palpitation is often distressing, attacks of syncope are not uncommon, and there is anasarca followed by ascites. The physical signs are: increased præcordial dulness, undue distinctness of the heart's sounds, sometimes irregular action of the heart, sometimes reduplication of the sounds, and generally almost imperceptible cardiac impulse. There will be no murmur if the valves remain healthy; unless the dilatation of the ventricles be so great that valvular incompetency is necessarily caused by the orifices becoming enlarged. Antispasmodics, ferruginous tonics, and agents to promote the digestion of nourishing food, are the only remedies which afford temporary relief in this serious disease.

* Diseases of the Heart, &c., second edition, p. 143. London, 1860.

XXIX. ATROPHY OF THE HEART.

There are two forms of atrophy of the heart. One, in which the organ simply wastes and dwindles in all its parts; the other, in which the texture of the muscle suffers a sort of conversion into fat—becomes affected with fatty degeneration.

Simple atrophy occurs in connection with many exhausting diseases, to wit: cancer, tuberculosis, diabetes, &c. The whole organ diminishes in size, so that after death it may be found to weigh about five ounces instead of nine. Minutely examined, the muscular fibres are detected pale and soft, but otherwise healthy. The treatment must be that which is demanded by the constitutional affection, of which the atrophy is merely one symptom.

Fatty degeneration of the heart is a most interesting disease, which has been already incidentally noticed (p. 156). The student who wishes to study the subject thoroughly may be especially referred to the writings of Dr. Richard Quain, Dr. Ormerod, Mr. Paget, Mr. Barlow, Dr. Wilks, and Prof. Virchow.

This disease occurs under two circumstances: either alone, or in conjunction with fatty disease of other organs, as the kidneys, liver, cornea, &c. Its *diagnosis* is beset with difficulties; so that when existing alone its presence is every now and then unsuspected until after death, and after a microscopic examination of some of the muscular fibres of the heart. Valvular disease very rarely coexists; but where it does, the aortic valves appear to be more generally affected than the mitral. There is no connection between this process of decay and the accumulation of adipose tissue around the heart. The most prominent *symptoms* of fatty degeneration are a feeble action of the heart, a remarkably slow pulse—sometimes as low as fifty or forty-five or even thirty-five in a minute, general debility, transient attacks of giddiness or faintness, a tendency to sigh frequently, a pallid and flabby appearance, a feeling of nervous exhaustion, and marked loss of tone, &c. Both sounds of the heart are weak, the first being especially faint; while the impulse of the apex against the chest-walls is feeble or even imperceptible. In advanced cases there are attacks of dyspnœa, produced by even moderate exertion; together with many or all of the symptoms which prevail in angina pectoris. When in addition there is a well-marked arcus senilis (due, as Mr. Canton has shown, to fatty degeneration of the edge of the cornea) the diagnosis may perhaps be facilitated; though I have long been convinced that in many cases of arcus senilis the heart is quite healthy, while the latter is often affected with fatty degeneration without the arcus being present.

Fatty degeneration of the heart seems to occur rather more frequently in men than in women; it may take place at all ages, though it happens principally at advanced periods of life; all classes of society may suffer from it. Moreover, it either exists singly, or with other cardiac diseases; and it is not an uncommon cause of sudden death. "On opening a heart thus affected," says Dr. Ormerod, "the interior of the ventricles appears to be mottled over with buff-colored spots of a singular zigzag form. The same may be noticed beneath the pericardium also; and in extreme cases the same appearance is found, on section, to pervade the whole thickness of the walls of the ventricle and of the carneæ columnæ." On microscopically examining these spots, their nature is revealed; they are not deposits,

but degenerated muscular fibres. Instead of seeing transverse striæ and nuclei—the evidence of a healthy state—little can be distinguished but a congeries of oil-globules. The muscular fibres are also found to be short and brittle; and Dr. Quain has pointed out that the coronary arteries are often obstructed. Mr. Paget well remarks that "the principal character which all these cases seem to present is, that they who labor under this disease are fit enough for all the ordinary events of calm and quiet life, but are wholly unable to resist the storm of a sickness, an accident, or an operation." From the foregoing it will appear that the *prognosis* must always be unfavorable. Dilatation, rupture, and aneurism of the heart are the prominent changes most frequently found in connection with this affection.

Sometimes the fat which is normally deposited upon the heart is increased on and amongst the muscular fibres to a morbid extent; and we then speak of the condition which results as *fatty growth*. This may happen alone, or in conjunction with general obesity; or it will be associated with fatty degeneration. It is possible that the arcus senilis much more frequently accompanies these cases of fatty growth, than those of fatty degeneration. The symptoms of fatty growth, when it exists alone, are those of a heart enlarged and impeded in the performance of its functions. The pulse is permanently quickened above the normal standard, while its force is diminished.

In the present state of our knowledge, the *treatment* of a case of suspected fatty disease of the heart resolves itself chiefly into preventing further degeneration of tissue. The means to adopt therefore are—nourishing animal food, attention to the digestive organs, pure air, early hours, gentle exercise, and the use of ferruginous tonics. Soda-water will prove useful as a drink; a little brandy or sherry may be given with it. The patient should daily take a salt-water sponging bath. Everything which can hurry the circulation ought to be avoided; while agents which weaken the power of the heart, such as tobacco, invariably prove mischievous.

Some authors object to the use of fat meats, of milk, and indeed of all oleaginous foods. But it is difficult to understand the ground on which these restrictions are recommended; since the disease is a degeneration of tissue, caused by debility or a wearing-out of the frame, rather than by an excess of power. Hence I believe that cod-liver oil, cream and milk, may generally be given with great advantage.

These remarks are not meant to apply to the treatment of fatty growth with general obesity. In such cases, the patient should be dieted according to the directions already (p. 193) given.

XXX. CYANOSIS.

Cyanosis [*Κύανος* = blue + *νόσος* = disease], morbus cæruleus, or blue disease, are terms applied to a condition characterized by a blue or purplish discoloration of the skin; arising generally in connection with some deficiency in the construction of the heart.

The chief malformations are the following: A permanence of the foramen ovale, allowing the passage of the blood between the two auricles; abnormal apertures in some part of the septum of the auricles or of the ventricles; the origin of the aorta and pulmonary artery from a single ven-

tricle; a transposition of the origins of the large vessels from the heart, the aorta arising from the right and the pulmonary artery from the left ventricle; an extreme contraction of the pulmonary artery; or, lastly, the continued patescence of the ductus arteriosus, permitting a mixture of the bloods of the aorta and the pulmonary artery.

Three explanations have been given as to the immediate cause of the discoloration of the surface in these cases of malformation. Thus, some pathologists refer it solely to general venous congestion; others regard the intermixture of the two currents of blood as the cause; while a third class believes that it is partly due to congestion of the venous system, and partly to the intermingling of the venous with the arterial blood. The truth is probably this, that the discoloration is owing to systemic venous congestion, but that it may be aggravated by certain malformations. On the other hypothesis it seems impossible to explain the admitted facts, that malformations permitting the free admixture of arterial and venous blood may exist without giving rise to cyanosis; while the latter is sometimes found where no such admixture could have taken place. The cause of the general venous congestion is some obstruction to the flow of blood through the lungs, or from or into the right ventricle; such obstruction frequently consisting in a contraction of the pulmonary artery or its orifice.

In addition to the discoloration of the skin, the patients who survive their birth suffer from coldness of the body (sometimes the temperature, as marked by the thermometer in the mouth, has been as low as 77° Fahr.), palpitation, fits of dyspnœa, syncope on the least excitement, &c. The tips of the fingers, and sometimes of the toes, become bulbous after a time, and the nails are often incurvated. The generative organs are frequently imperfectly formed—there is evidence of early arrest of development. Bronchial hemorrhage and bronchorrhœa seem to have occurred in many instances. Moreover, in cases about to terminate fatally we have congestion of internal organs, and dropsical effusions. The cutaneous discoloration is generally increased by aught which excites the circulation; while if there is no valvular lesion the sounds of the heart will be found normal. With some few cases the symptoms of cyanosis are not manifested until many months after birth. Infants affected with the disease generally die at a very early age; but, occasionally, they live on even to the adult period. Males are notably more prone to cyanosis than females; a satisfactory explanation of this fact remains to be discovered.

The physical signs are diversified, just as the malformations are multifarious. Whatever the defect may be, however, there is frequently hypertrophy with dilatation of the right ventricle. Murmurs will of course be detected if there be valvular incompetency, or constriction of the orifices.

Under exceptional circumstances cyanosis may not come on until somewhat late in life. Cases like the following are related: A lady, aged 38, under the care of Dr. Theophilus Thompson, was always well until she had an attack of cholera, which impaired her health; two years prior to her death she suffered from fever, and from this time was cyanotic. Bouillaud quotes an instance where cyanosis followed a difficult labor at the age of twenty-six. Dr. Harrison has recorded the case of a baker, who became cyanotic at 15, after using great exertion in carrying wood. Dr. Speer has published the history of a girl, thirteen years old, who had to fill a situation needing great exertion, and she was thenceforth cyanotic. Dr. Reisch, of Vienna, has given an account of a woman, 49 years old, who always had good health until an attack of rheumatic fever with endo-pericarditis, after which cyanosis and dropsy set in. Auscultation detected a loud systolic bruit, which had its maximum intensity at the apex of the heart; the

second sound being weak and indistinct. There was intense cyanosis of the face; with considerable swelling of the jugular veins, and evident regurgitation in them. At the autopsy, in addition to other morbid appearances, the valve of the foramen ovale was found imperfect, there being a crescentic opening which admitted the first joint of the little finger. Dr. Reisch explains the symptoms in the following way: The congenital insufficiency of the valve of the foramen ovale had given rise to no cyanosis previous to the rheumatic attack, and accordingly no communication between the blood in the auricles could have taken place; for, so long as the valves were healthy, the pressure in the two auricles remained equal, so that the passage of blood from one side to the other was impossible. But when as the result of endocarditis incompetency of the mitral valve became established, an increased tension was exerted on the blood in the left auricle, whereby not only a congestion of the pulmonary circulation was occasioned, but simultaneously a quantity of blood was pressed into the right auricle. Thus there was laid the foundation for a high degree of cyanosis, and the bad effects of mitral insufficiency upon the circulation acquired an enormously increased potency. The passage of blood from one side to the other must have taken place at the moment of ventricular systole, for this was manifestly the time when the difference of tension in the auricles had reached its maximum. The blood flowing from the left into the right auricle must have presented an obstacle to that entering by the venæ cavæ, and by imparting to it an impulse in the centrifugal direction, have given rise to the systolic venous impulse.

The *treatment* should be simply palliative, the organic cause being irremediable. A very nourishing diet, warm clothing, the avoidance of fatigue or undue mental excitement, and residence in a pure mild air, will give the sufferers from cyanosis every chance of life which can be afforded them.

XXXI. RUPTURE OF THE HEART.

Rupture of the heart may occur spontaneously from previous disease, or it may be caused by external violence. Rupture from disease is much more frequent on the left than on the right side of the organ; whereas, when it occurs from external violence we find just the reverse. The laceration most commonly has its seat in the ventricles, and in that of the left side when disease is its source. Out of fifty-two cases collected by Gluge, the left ventricle was the seat of the lesion in thirty-seven, the right ventricle in eight, the left auricle in three, and the right auricle in two cases. Rupture of the valves or their tendons is generally the consequence of a prior attack of endocarditis, whereas laceration of the muscular wall of the heart most frequently is symptomatic of fatty degeneration. Probably there are six ruptures from fatty degeneration to one from any other cause. Laceration may also be due to an aneurism in the ventricular wall; to malignant degeneration; and perhaps hydatids, by causing atrophy of the muscular fibres, might lead to it. The rupture takes place as frequently at the apex as at the base. The immediate cause is usually some sudden strain or emotion. This accident happens more frequently in males than females, while its occurrence is rare until after the fiftieth or sixtieth year.

I have seen a case of sudden death from ulceration of the wall of the left

ventricle ending in rupture where there had been no previous symptoms of heart disease. And yet the ulcer was nearly if not quite the size of a florin, was in my opinion of a cancerous nature, and had fairly eaten its way through the tissues, the rent being one inch in length. The gentleman who was the subject of this disease was 68 years old. He had gone to bed apparently quite well; must have got up in the night, and was found dead in his chair the next morning. There could scarcely have been any suffering, for his features were calm, while a book he had been reading remained open on his lap.

Supposing that death is not the immediate result of this accident, the symptoms which indicate the occurrence of rupture are great orthopnœa, intense prostration, syncope, and convulsions. In laceration of the valves, of the chordæ tendineæ, or of the musculi papillares, there is sudden great oppression about the præcordia, together with a loud endocardial bruit.

As regards the majority of cases, rupture of the heart kills instantaneously; not so much, however, as a rule, by the loss of blood, as by the embarrassment to the play of the heart or lungs which arises from the extravasation. In more than one instance, however, the patient has been known to survive some hours, or even days, the wound having become plugged by coagula, so that the extravasation of blood into the pericardium has taken place slowly and gradually.

XXXII. ANGINA PECTORIS.

This is a paroxysmal disease, first described by Dr. Heberden in 1768, who called it a *disorder of the breast;* remarking that "the seat of it and the sense of strangling and anxiety with which it is attended, may make it not improperly be called *angina pectoris.*" It is of not very frequent occurrence.

The *symptoms* of "suffocative breast-pang" consist of paroxysms of intense pain about the præcordial region, accompanied with a feeling of suffocation and a fearful sense of impending death. The pain in the breast is variously described by sufferers as lancinating, burning, or constrictive; and it often seems to radiate from the centre of the sternum to the neck, or to the back, or to the left shoulder and arm. If the paroxysm come on while the patient is walking, immediate rest is necessary; the anguish being most extreme for the time. During the attack the pulse is slow and feeble, the breathing short and hurried, the countenance pale and anxious, the surface of the body cold and perhaps covered with a clammy sweat, while the consciousness is unimpaired. As the struggle passes off, the patient regains his usual health, and perhaps appears perfectly well.

The duration of the seizure rarely exceeds two or three minutes, though it may last for half an hour, or an hour, or even longer. The attacks occur at uncertain intervals of weeks or months; but in confirmed cases the periods of recurrence approximate more and more with each successive paroxysm. The seizure may come on at any time: not only when the patient is walking, but even when in bed. The pain is most severe, and is attended with a feeling as if life were about to cease, while in several cases the paroxysm has at once proved fatal.

It necessarily follows from the foregoing, that the *prognosis* is unfavorable to a marked degree; for if death do not ensue in an early seizure, it

generally does so in some subsequent attack. The disease occurs most frequently in advanced life, and is much more common in men than in women. In some few instances it has seemed to have an obscure connection with gout, and I have read of gout and angina pectoris alternating with each other in the same individual. But I apprehend this only happens in gouty subjects who have a weakened heart, either from attenuation or from fatty degeneration.

With regard to the *pathology* of angina pectoris, it may be said that our improved means of observation have rendered it almost certain that this most distressing disorder is always associated with some important organic cardiac affection; although, in all probability, it is not connected with one form of heart disease only. In many instances fatty degeneration of the muscular fibres of the heart has been detected; a condition which, occasionally at least, seems to be connected with partial obstruction of the coronary arteries. Sometimes possibly, atheromatous deposit, or a syphiloma, about the root of the aorta and aortic valves, will be found to have obstructed the coronary arteries by encroaching upon their openings.

Sir John Forbes, in an essay published in 1833, before the value of the microscope was appreciated, collected the histories of forty-five examples of angina pectoris, in which the body had been examined after death. In two of the cases there was disease of the liver only; in four, there was nothing morbid except an excessive coating of fat about the heart; while in the remaining thirty-nine there was found organic disease of the heart or great vessels. Of these latter cases, in ten there was organic disease of the heart alone; and three of the aorta alone; in one of the coronary arteries alone. But there was ossification, or cartilaginous thickening of the coronary arteries, combined with other disease, in sixteen instances; and there was a morbid condition of the cardiac valves in sixteen cases likewise. The aorta was diseased in twenty-four cases, and in twelve there was preternatural softness of the heart.

The *treatment* during a paroxysm consists in the administration of stimulants, such as ammonia, wine, and brandy; and of antispasmodics, as ether, opium, chloroform, hydrocyanic acid, &c. I have found a mixture of ammonia, spirit of chloroform and of ether, a little belladonna, and tincture of cantharides (F. 85), exceedingly valuable in giving speedy relief. The patient should always carry a dose of this medicine about with him, in order that it may be taken on the least threatening of an attack. Sinapisms, turpentine stupes, hot fomentations, and liniments containing belladonna and chloroform, will help to relieve the suffering.

The return of the seizure is to be guarded against by improving the general health; by constant attention to diet; by the occasional use of well-selected tonics; and by the avoidance of stimulants, strong exercise, walking soon after meals, and all mental excitement. A belladonna plaster worn constantly over the præcordial region may do good.

XXXIII. CARDIAC ANEURISM.

Aneurism of the heart was formerly said to occur in two forms: either as a simple dilatation of the wall of a ventricle, forming the improperly called *passive aneurism* of Corvisart; or as a pouched fulness arising abruptly from the ventricle, constituting a tumor on the heart's surface. The latter is the only disease to which the designation of cardiac aneu-

a fringed margin of endocardium with vegetations attached. The
›r chronic form is the result of some inflammatory condition of the
r fibre, or of the investing or lining membrane of the heart. The
: the sac consist of the endocardial and pericardial membranes
›n, while the muscular fibre seems to be replaced by a fibroid tissue.
ɛind gives rise to symptoms which are uncertain and obscure. Often
age of the blood into the sac has caused a murmur, but this has
istaken and thought to be due to some valvular lesion. Death
ɔ consequence of the supervention of extraneous disease unconnected
aneurism; or it will happen suddenly from the wall of the latter giv-
, the blood being poured into the pericardium, or into the pleura—
ɛe surfaces of the pericardium be adherent, as they often are in these

ɔronary arteries are now and then diseased. Fatty degeneration and
ion of their coats, obstruction of their canals, and small aneurismal
›ns of their walls, are not frequent events. There may be only one
n; or several branches of both the right and left coronary artery,
›r both main trunks will perhaps be found dilated into a set of sac-
little tumors. With this condition, all the other vessels in the
ɛed not necessarily be otherwise than healthy. In the instances
ave been recorded there have been no symptoms during life to allow
rect diagnosis, or sometimes even of a suspicion of heart disease;
ɛath has occurred gradually from a progressive loss of strength, and
ion, or suddenly from rupture of the aneurism—the pericardium
ɛerwards found filled with blood.

XXXIV. TUMORS OF THE HEART.

id growths of a benignant or malignant character in the interior of
rt are of rare occurrence, and consequently very little is known of

...ns with ... the following summary of the signs which were ...
The patient was a gentleman, aged 35, of large frame and ...
There was a ... commencement of the symptoms. A previous ...
... Dyspnœa with an absence of signs of pulmonary ...
... Tumultuous ... the circulation, with regularity. ... breathing; paroxysms ... exclusive attacks, and tearing ...
... circulation through the lungs ... but rapidly developed. ... more marked cardiac impulse ... Assimilation in the ... one of those semi-convulsive ... At the *necroscopy*, on opening ... extremity of a tumor was seen ... opening the left auricle, this ... of such bulk as seemed nearly ... and hanging downwards, its point ... The tumor was 4½ inches long, 2½ broad, and ... dependent part was ... and it presented nodules of a ... The tumor was organically connected with the auricular ... On the other side of the auricle, opposite ... there were small ... with those of the tumor itself; this structure ... many of them resembling connective ... having the appearance of typical cancer-cells. There ... in the auricular appendage, nor between the ... The right side of the heart presented no abnormality. ... were open, and the valves of the heart were ... was slightly dilated in its ascending portion, and just ... an insignificant narrowing, with a small cicatrix at the ...

Dr. M... exhibited at the Manchester Medical Society, in March, a preparation which he believed to be unique. The patient, 28 ... had suffered from one or two attacks of rheumatic fever. ... complicated cardiac murmur, partly exocardial and partly double. Death took place very gradually. At the subsequent examination ... found that the right auricle contained a *loose tumor*, about as large as a pigeon's egg, composed of phosphate of lime and fibrous stroma. The tumor had evidently grown from the wall of the auricle, had become detached, and had then rolled about in the current of blood; for both ... surface and on the inside of the wall were to be seen the remains of ... cle. Another tumor, still small, was also in process of formation ... auriculo-ventricular valve was worn away at one part by the attrition ... the substance.

In a case of rupture of the heart shown to the Pathological Society ... Dr. Moxon in February, 1866, there was seen, on cutting into the substance ... of the septum of the left ventricle, a pale cheese-colored *fibrinous* ... resembling decolorized blood-clot. Dr. Moxon expressed his belief ... deposits such as this, which are nearly always in the septum, are not ... than clots formed in the substance of the ventricular wall by injury ... vessels, occurring in ruptures that are not sufficiently extensive to ... either surface of the wall.

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* Edinburgh Medical Journal, p. 908. No. 154, April, 1868.

ccording to Dr. Oppert, up to the year 1867, eight cases of *syphilomata* ıe heart had been recorded in medical literature. The little tumors ar to have given rise to pain, irregular action of the heart, palpita-, dyspnœa, &c.; while sometimes a slight systolic murmur was noticed. histories show that these growths are liable to soften, and that they produce ulceration of the heart and embolism. Their diagnosis must ıade through the presence of syphilitic affections of other organs.
ccasionally a cure can be hoped for from the use of specific remedies, ided they are employed at an early period before degeneration of the ular tissue has set in.
here the syphilitic deposit on the walls of the heart has taken place ly, there has been found hypertrophy of the organ. In an instance ed by Ricord, the constitutional infection was of long standing; the sore being contracted in 1824, while death from syphilitic degenera- of the muscular fibres of the heart did not happen until 1845. Mr. gan, of Dublin, has published the medical history of a prostitute who sores on the genitals eighteen years before death took place, in July, , from the formation of gummata in the walls of the ventricles.

ıses of primary *cancer* of the heart are very seldom met with. Less ımmon are instances where the malignant disease has spread to the t from adjacent organs,—from the glands in the neck, the bronchial ds, or the lungs. But most frequently where the heart is invaded by er, this affection has occurred secondarily; there either is or there has malignant disease in some other organ of the body.
ancer of the heart, whether primary or secondary, has rarely given to such symptoms that its existence has been diagnosed during life. case of this disease which was under the care of Dr. Peacock at the oria Park Hospital, and in which particular attention was paid to heart, because it appeared clear that there was a tumor in the chest, the patient stated that his father died of cancer of the heart, yet no ptoms specially indicating that the heart was involved could be de- d.
he cancerous deposit, which is most frequently of the medullary kind, be found about the pericardium, or in the muscular substance of the t. In an instance reported by Dr. Bright, a thick layer of yellow ignant disease covered the whole of the visceral and parietal portions he pericardium; so that this fibro-serous membrane was glued to the rt. The external wall of the right ventricle has been found occupied a large knotted tumor, looking like a supernumerary heart and formed ıedullary cancer. In addition to masses of cancer involving the walls he heart, the columnæ carneæ, and the musculi pectinati, we find that surfaces of one or more of the valves may have cancerous vegetations ıeding the proper closure of the openings.

XXV. FUNCTIONAL DERANGEMENT OF THE HEART.

he disorder now to be considered is of special importance on account of mental distress to which it gives rise. For it is a curious feature in dical practice, that whereas patients with grave structural disease of the rt (prior to the occurrence of the secondary evils) seldom consider that re is anything radically wrong, individuals with mere deranged action

can scarcely be persuaded that they are not doomed to an early and sudden death. The latter are unable to understand how indigestion, fast living, the abuse of tobacco and tea, or severe mental labor with insufficient bodily exercise, can produce palpitation with an intermittent pulse; while the physician who assures them that there is no cardiac disease, is either regarded as one ignorant of his business, or as a good-natured fellow, afraid to tell an unwelcome truth.

Functional disorder can closely simulate organic disease of the heart. There may be an irregular feeble pulse, palpitation, and fluttering; with a cardiac murmur and subcutaneous œdema in anæmic subjects. A systolic murmur, sometimes audible at the base and apex, may even be heard in a few healthy individuals, under the influence of great nervous excitement. The local suffering is usually greater than in organic diseases; the patient complaining either of a dull wearying ache in the præcordial region, or of occasional lancinating pains. Frequently there is inability to lie on the left side, owing to tenderness. There is always great depression of spirits; the digestive organs are deranged, flatulence and acid eructations being especially common; a sense of choking, or of the rising of a ball in the throat, is complained of; and there may be occasional attacks of giddiness, faintness, headache, noises in the ears, flushing of the face, violent pulsation in the aorta and other arteries, &c. There is rarely any dyspnœa, if the blood be healthy; and even when the breathing is hurried, the patient hardly refers to it, all his thoughts being fixed on the palpitation or thumping of his heart, and the pain.

Some remarkable examples of unusually rapid action of the heart are to be found recorded in the medical periodicals. In one instance, a patient who consulted Dr. Cotton, had a pulse too rapid to be counted; the respirations were 40; while the pulsations of the heart were 230 in a minute. Three weeks after the commencement of the attack, the action of the heart suddenly became natural in every respect, and the pulse fell to 80. Four or five similar attacks took place; most of these ending in recovery, while the patient was taking digitalis. Dr. Cotton believes that such rapid action of the heart, when unconnected with organic mischief, or inflammatory disease, or displacement, must be due either to the heart being so extremely sensitive that it contracts upon the healthy blood before the cavities have got filled; or else the blood is of such an abnormal and irritating character, that it excites premature contraction. One symptom remained after recovery from the last attack, viz., pulsation of the right jugular vein; this being probably due to the tricuspid valve allowing of regurgitation. Why the valve should continue incompetent, and should not give rise to a regurgitant murmur, are questions difficult to answer.* A second case is reported by Dr. Edmunds. It ended in recovery. A similar instance happened in the practice of Sir Thomas Watson; where the beatings, "or rather the waggings," of the heart were found to number 216 in the minute. There was no murmur. In a day or two, the inordinate action suddenly ceased, and the pulse numbered 72. During a third seizure, the attack suddenly passed off while Sir Thomas Watson was present. A fourth attack proved fatal. At the autopsy the heart was found large, as if it had been distended; while the muscular walls were very thin and soft. No other morbid state could be detected.

To prevent any error in the diagnosis of functional from organic affec-

* British Medical Journal, p. 630. London, June 1st, 1867. The case by Dr. Edmunds will be found in the same journal, p. 721, for the 15th June; while that mentioned by Sir Thomas Watson is at p. 752, June 22d, 1867.

tions of the heart, the physical signs of valvular disease (as already described) must be borne in mind. Moreover, the patient ought to be examined with the greatest care; and the practitioner, if in doubt, should reserve his opinion until he can make a second investigation. The disease, perhaps, most likely to be overlooked is fatty degeneration, especially if the pulse be temporarily hurried, and the corneæ appear healthy.

Functional disturbance of the heart often occurs in cases of hysteria, ovarian or uterine irritation, neuralgia, and anæmia; it is frequently complained of by women at "the change of life;" it may be associated with the derangements due to nervous exhaustion—such as overstudy, mental anxiety, sexual excesses, &c.; morbid states of the blood, gout, rheumatism, or chronic disease of the liver can produce it; the use of tobacco or strong tea not uncommonly originates it; and lastly, it is a frequent result of all forms of dyspepsia.

The object of our treatment must be to allay the symptoms, while we also endeavor to remove their source. The cause of the suffering ought to be fully explained to the patient, and he must be led to feel confidence in our ability to cure him. To quiet the circulation, antispasmodics and sedatives and special tonics will be needed. Perhaps few remedies of this description answer better than ammonia, ether, sumbul, henbane, belladonna, hop, opium, &c. (according to F. 86, 93, 95, 326, 337, 361). The officinal belladonna or opium plaster, applied over the præcordia, gives relief. Where the patient can bear digitalis, which most probably acts as a cardiac tonic, this drug (F. 334) will prove very useful. Supposing it be desirable to effect a compromise in the treatment—to feel one's way, the American wild cherry (F. 333) can be prescribed instead of digitalis. If there be constipation with unhealthy secretions, a warm aperient (F. 146, 149, 162) should be ordered. Then, if the deranged cardiac action appear to have any connection with gout, saline effervescing draughts with colchicum (F. 46, 348, 352) ought to be administered. Where there are acid eructations with dyspepsia, bismuth, soda or potash, hydrocyanic acid, laurel water, &c. (F. 65, 67, 70), will be necessary; followed at the end of a few days by the nitro-hydrochloric acid in some bitter infusion (F. 378). Pepsin (F. 420) frequently does good in these cases of dyspeptic misery, although it will be useless without particular attention to the diet. The patient who cannot afford time to eat his meals quietly, and to masticate his food thoroughly, must bear his troubles. The practitioner will have to see that the teeth and gums are in a proper condition. It is astonishing that people should expect to enjoy good health, while their gums are sodden and filled only with decayed teeth and useless stumps. In these days of painless dentistry and the skilful adaptation of artificial teeth, every mouth ought to be clean and sound. Supplementary to the foregoing, the use of tobacco and tea should be forbidden; while it must be remembered that malt liquors more frequently than not disagree. A small quantity of brandy in iced soda-water is generally most suitable. And lastly, if there be symptoms of nervous exhaustion, or if the patient be anæmic, steel will be required. The best preparations in these cases, as a rule, are the citrate of iron and ammonia (F. 401, 403), the reduced iron (F. 394, 404), the citrate of iron and strychnia (F. 408), or quinine and iron (F. 380).

XXXVI. INTRA-THORACIC TUMORS.

An intra-thoracic tumor either consists of an aneurism; or it may be composed of cancer, of simple exudation-matter, of fibrous tissue, or of masses of fatty or steatomatous matter. Putting aside the cases of aneurism, we find that the other tumors, whatever be their nature, commonly have their origin in the connective tissue and glandular structures, and are developed in the mediastina. The symptoms they produce are chiefly due to the pressure exerted on the heart or lungs, or on the nerves or vessels; and consequently there may be no indications of disease for a time, as a tumor often attains some size before it interferes with the circulation or the respiration.

The symptoms of mediastinal tumor are exceedingly variable. Speaking generally, we find more or less pain, restlessness, cough, dyspnœa or even orthopnœa, frothy or viscid expectoration, palpitation, hoarseness, frequently dysphagia, and every now and again hæmoptysis. By its irritating effects the tumor may produce pleurisy, bronchitis, pneumonia, and inflammation of the larynx or trachea. By the pressure exerted it is not unlikely to cause pulmonary collapse, if a main bronchus be obstructed; or a bulging or even perforation of the ribs and sternum; or displacement of the heart; or it will perhaps impede the circulation through the aorta, or through the superior or inferior vena cava. The dulness on percussion becomes more marked as the growth protrudes into the anterior mediastinum; while the auscultatory signs will vary according to the nature of the secondary phenomena.

Primary hydatid disease of the lung, or of the mediastinal structures, is hardly ever met with. In cases where hydatids, or portions of their cystic membranes, are expectorated, the original seat of the parasitic growth has been the liver. At least, this has been the case with the great majority of instances.

With regard to cases of primary cancer involving the root of the lung, it is remarkable that inflammatory condensation of the pulmonary tissue, with disorganization and abscess, may result comparatively early. In the only three examples of this rare and obscure disease which fell under Dr. George Budd's observation at King's College Hospital, during nearly twenty years, the tumor implicated the root of the right lung.* The extent of change in the lung in these three cases was greater as the tumor was larger, and involved more completely the root of the lung; while in all, the left lung was free from adhesions, and presented only those appearances which result from recent congestion. As to the way in which these changes arose, Dr. Budd suggests that they resulted from the tumor involving and destroying all or a greater part of the pulmonary nerves; and consequently the inflammatory affections of the tissues of the lung in these instances are analogous to that destructive inflammation of the eyeball which results from disease involving the fifth nerve within the orbit. The lung resembles the eyeball in this respect, and all the nerves which supply it are comprised at its root in a very small space, so that they can there be destroyed or paralyzed (and the organ, in consequence, be deprived entirely of nervous influence) by disease of no very great extent.

Mediastinal cancer is seldom primary. It may occur secondarily to disease of distant organs, or it can possibly spread from the lungs. The

* Medico-Chirurgical Transactions, vol. xlii, p. 215. London, 1859.

termination in mediastinal tumor, whether this be cancerous or not,
ı takes place slowly, the patient's sufferings from impeded respira-
want of sleep and appetite, debility, and anæmia, gradually increas-
until he dies anasarcous and exhausted. Sometimes, however, death
s place almost suddenly from hemorrhage, from thrombosis, or from
m of the glottis. All that art can do in these very distressing cases
› palliate the prominent symptoms. Great temporary relief may,
ɜver, be often given by the cautious use of diuretics or of aperients,
.ry cupping, by inunction with the ointment of red iodide of mercury
part of the officinal ointment to three of lard), or by freely rubbing
he compound iodine ointment (equal parts of the ointment and cod-
· oil); by venesection, to the extent of six or eight ounces, if symp-
ı of pulmonary or cardiac congestion predominate, and by employing
ɜpasmodics, such as ether, spirit of chloroform, ammonia, opium, bel-
nna, stramonium, &c.

PART VI.

DISEASES OF THE THORACIC WALLS.

I. PLEURODYNIA.

PLEURODYNIA [from *Πλευρὰ* = the side + *ὀδύνη* = pain], or chronic rheumatism of the walls of the chest, is a disorder of almost everyday occurrence. It is of importance on account of the long-continued pain to which it often gives rise, and partly because it is always believed by the patient to be an inflammation of the side, while every now and then it is mistaken by the practitioner for pleurisy or pericarditis, or even for peritonitis.

This affection is sometimes associated with rheumatism of the joints, but in by far the greater number of cases there is no such combination. In nineteen cases out of twenty, the muscular and fibrous textures of the left side of the chest are alone affected. The pain may be acute, and it often comes on suddenly, being referred to the infra-mammary region (though sometimes it extends rather lower), and being increased by a deep inspiration or by any stretching movement of the trunk.

The *diagnosis* is easy with moderate care, for, although there is often tenderness on pressure, with slightly impaired thoracic movement, yet there are none of the physical signs of pleurisy, &c. The pulse also does not betoken inflammation, while the tongue is clean, the skin inclined to be cool rather than unduly hot, and there is no real dyspnœa. Out of the large number of cases which I have seen, I can recollect none where the general symptoms have not been those of impaired health, with debility, there usually being found, moreover, more or less constipation, loss of appetite, mental depression, and the secretion of urine containing an excess of phosphates or urates. One of the worst examples of pleurodynia which I have met with, occurred in a medical man who was suffering from acute rheumatism affecting the knees and ankles, and I well remember the incredulity with which he received my opinion that his pericardium was healthy, as well as the difficulty that was experienced in preventing him from taking calomel and having a vein opened. The success which followed the use of simple treatment, however, quite reassured him. In tertiary syphilis there is often pain about the middle of the sternum, and sometimes costal periostitis; but a consideration of the general symptoms, together with a local examination, will prevent this disease from being mistaken for pleurodynia. In herpes zoster, or the shingles, sharp pain often precedes the appearance of the vesicles, but the suffering is usually of a burning character, is not increased by movement, and in the great majority of cases is on the right side of the body.

Pleurodynia affects men rather more frequently than women, probably because of the greater exposure of the former to the sources of rheumatism.

The residents of marshy districts, the inhabitants of damp houses, coal porters and other laboring men who drink large quantities of beer, as well as policemen or soldiers on night duty, are very liable to this affection.

In the *treatment* of these cases, overactive remedies ought decidedly to be avoided. Cupping, leeching, severe purging or sweating, and blistering, will only render the disorder more intractable. If the pain come on in the course of rheumatic fever, it may merely be necessary to order fomentations or hot poultices in addition to the remedies which are being employed. But in ordinary cases, where the pleurodynia is the sole manifestation of any disease, a cure may generally be effected in from three or four days to a fortnight, by a mixture of ammonia, tincture of aconite, and bark (F. 371); by one or two warm water or Turkish baths (F. 130); by friction night and morning with a belladonna and opium liniment (F. 281); and by plain nourishing food. Stimulants can be given if necessary, but all kinds of beer and port wine should generally be avoided. In obstinate cases iodide of potassium (F. 31) may be required, while cod-liver oil will often prove extremely useful.

II. INTERCOSTAL NEURALGIA.

Neuralgia [from *Νεῦρον* = a nerve + *ἄλγος* = pain] may affect the intercostal, as it does the other nerves of the body. The pain is either of a dull and continued aching character, or it comes on in sharp paroxysms, while it is most frequently situated in the sixth, seventh, eighth, or ninth nerves of the left side. These nervous trunks (anterior primary branches of the dorsal nerves) pass forwards in the intercostal spaces with the vessels, and are distributed to the parietes of the thorax and abdomen. The pains, whether dull or severe, follow the course of the nerves, and extend from the thoracic wall directly backward to the vertebræ. One or two particularly painful spots can often be detected by pressure, while sometimes there is cutaneous hyperæsthesia of the whole mammary or infra-mammary region. There are no febrile symptoms; the pleuræ, lungs, and heart are found healthy; but there are often indications of debility. The catamenia are sometimes irregular, or the flow may be supplemented by an abundant leucorrhœal discharge, Oftentimes there is some uterine or ovarian disorder present, particularly such as retroflexion, excoriation of the labia, or chronic ovaritis.

Chlorotic and hysterical women suffer most frequently from this species of neuralgia. I have met with it during the progress of Bright's disease. It may form a subsidiary phenomenon in phthisis. The pain sometimes lasts for weeks, being got rid of with the greatest difficulty in those cases where there is no obvious condition of the general health, or no local affection, to account for it. Intercostal neuritis is the only disease with which it can be really confounded, and this is of very rare occurrence. A dull tensive aching, referred to the left hypochondrium, is not unfrequently complained of in affections of the spleen; but the pain is seldom troublesome until the gland has become so much enlarged that it can be readily felt.

The remedies which are usually the most beneficial consist of quinine, iron, cinchona, cod-liver oil, and a nutritious diet. Friction with liniments containing belladonna and aconite gives relief. Sometimes, pressure by means of strips of belladonna plaster, applied all round the thorax, is a

source of great comfort. Where there are one or more obstinately tender points, the subcutaneous injection of the sixth of a grain of morphia (F. 314) will effect a cure, if employed in conjunction with remedies that improve the general health.

III. THORACIC MYALGIA.

The tendinous insertions of the fleshy bodies of the pectoral muscles, and sometimes of the intercostal muscles, every now and then become the seat of a hot wearying pain, which is often mistaken for pleurodynia and even for more serious diseases. It is probable also that the diaphragm, like the other muscles of respiration, occasionally suffers from myalgia; especially where the ceaseless action of this septum gets exaggerated by affections attended with dyspnœa.

Myalgia [*Μῦς* = a muscle + *ἄλγος* = pain] is generally due to overwork of the affected muscles. It is a disorder common to both sexes, though probably arising most frequently in males. The pain is seldom complained of in the morning, especially after a good night's rest; but it follows upon a few hours' exertion, and gradually increases towards the evening. Patients give various accounts of the amount of suffering, and frequently the descriptions appear to be exaggerated. No doubt some individuals feel pain much more acutely than others; so that what is regarded as almost torture by one would be looked upon as trifling by another. The physical suffering, however, is not on these grounds to be lightly thought of; and especially should the practitioner avoid the habit easily acquired of looking upon a reputed pain as imaginary, because it is spoken of in more extravagant terms than he may think warrantable.

In all cases of persistent myalgia the blood is more or less impoverished, and consequently the general health will be found depressed. Sometimes the appetite is bad, and the digestion impaired; the bowels are constipated; attacks of palpitation are common; the sexual functions are disordered; and there is a disinclination for work of any kind. The patient also is irritable or low-spirited. From this it follows that the treatment should consist in diminishing for a time those exertions or movements which have been the partial cause of the disorder; while a certain amount of rest is to be especially insured to the affected muscles by the application of a flannel bandage round the thorax. Friction with anodyne liniments will also be of service, but above all the general health ought to be improved by remedies to promote digestion, quinine with ferruginous tonics, and nourishing food. The use of strips of opium or belladonna plaster around the painful part of the chest often does good; the favorable result being partly due to the support afforded to the muscles, and partly to the soothing of their excessive irritability.

IV. ABNORMAL CONDITIONS OF THE DIAPHRAGM.

Considering the very important parts with which the diaphragm is in relation, it cannot appear surprising that this thin musculo-fibrous septum often gets involved in the diseases of adjoining organs and tissues. Independently of its position as a barrier between the thorax and abdomen, the

diaphragm is the most important inspiratory muscle. Then its upper or thoracic surface is in relation with three serous membranes—the pleura on either side, and the pericardium covering the tendinous centre; while its under or abdominal surface is closely connected with the peritoneum. Moreover, through three large openings in its coats are transmitted the aorta and thoracic duct and right azygos vein, the œsophagus and pneumogastric nerves, and the inferior vena cava. Being thus placed in such close approximation with the pleuræ, lungs, and heart by its upper convex surface, it cannot but often become involved when morbid action is set up in these vital organs. So the connection of its under concave surface with the liver, the spleen, and the left or greater extremity of the stomach, and less intimately with the kidneys, pancreas, transverse portion of the duodenum, and solar plexus, must materially tend not only to influence its action, but also to make it a frequent secondary seat of disease.

Inflammation of the diaphragm, or diaphragmitis [*Διάφραγμα* = a separation between two parts, from *διαφράγνυμι*, with the terminal *-itis*], is probably only met with by the physician when it sets in consecutively to disease in adjoining organs. The morbid action may possibly, however, have its starting-point in a rheumatic state of the system; none of the thoracic or abdominal viscera being at the same time affected. As a consequence of punctured wounds, fractured ribs, and other mechanical injuries, diaphragmitis is every now and then observed in hospital practice.

The chief symptoms of this disease are those presented in other important inflammations; supplemented by the occurrence of severe tenderness with a sense of constriction around the upper part of the abdomen and back, great pain about the sternum and lower ribs on coughing or sneezing or making a deep inspiration, more or less dyspnœa, the performance of the respiratory movements almost wholly by the intercostal muscles, painful deglutition, anxiety of countenance, frequent hiccup and sobbing, spasms or cramps of all the abdominal muscles, and perhaps a sense of suffocation with delirium. Where, in fatal cases, an opportunity has been afforded of ascertaining the effects of the inflammatory action, the results which have for the most part been observed have consisted of effusions of coagulable lymph or of a sero-albuminous fluid, or of patches of ulceration, or of small collections of pus. When recovery has happened and examinations have been made after the lapse of years, the diaphragm has been seen to have become abnormally adherent to neighboring viscera; while it has also perhaps been found considerably thickened, with its tissue rendered almost as dense as cartilage.

The treatment should be of the same character as that required in inflammations of the organs connected with this muscle. Belts of linseed poultice, made very hot and moist, and medicated with the extracts of belladonna and poppies (F. 297) are especially serviceable. Vomiting is to be allayed by the use of ice. The inhalation of chloroform and ether (F. 313) will often relieve the hiccup when all other remedies fail. The persistence of pain at any one point can be stopped by the use of the ether spray, or by subcutaneous injections of morphia and atropin (F. 314). The importance of milk as an article of nourishment is not to be overlooked.

Fatty degeneration of the diaphragm is a morbid state which is probably more common than at first sight the practitioner will feel inclined to believe. The affection, however, has been overlooked; and chiefly for the reason that in a large number of post-mortem examinations the condition of this

septum still escapes investigation. So far as I can call to mind, Mr. G. W. Callender has been the first to notice this disease.* Here and there cases have been reported where the diaphragm has been discovered wasted in connection with a similar affection of the other muscles of the body. But in the widely different instances published by Mr. Callender, the tissue of the diaphragm has been found to have undergone conversion into fat; the granules of which have destroyed and taken the place of the muscular fibres. For the most part, this degeneration has been met with in connection with a similar change in the muscular structure of the heart; so that sometimes death has occurred from a failure of the action of this organ, sometimes from severe disturbance and embarrassment of the breathing, owing to the inability of the spoiled and fatty diaphragm to contract properly and to allow of normal inspiration. Now and then not only the structure of the heart and diaphragm is more or less destroyed by fatty degeneration, but other muscles, with the liver, and coats of the bloodvessels, are injured in a similar way. In such, death may of course happen in one of several ways,—from exhaustion, from syncope, from rupture of the heart, from cerebral hemorrhage owing to the coats of a vessel giving way, or from the breathing becoming labored to a degree incompatible with life. The question as to which organ shall first give way, will probably be determined by accident; that which becomes overstrained or excited being the one to yield.

Cancer of the diaphragm, as a primary disease, is unknown. Cancerous infiltration or deposit, the consequence of the extension of malignant disease from the liver or œsophagus, or other adjoining organs, is not very uncommon. Under these circumstances, one or more large masses of cancer will, perhaps, be found on the under or upper surface of the diaphragm; or there may be merely a number of papulæ, with small patches or lamina formed by the coalescence of several of these pimples. Moreover, isolated cancers have been observed in this structure; that is to say, cancer of the diaphragm may be the only disease detected at the necroscopy, the original mischief having been removed some time previously by operation. This appears to have been so in a case related by Sir Robert Carswell; in which several nodules, varying in diameter from a pea to half a crown, and formed of a scirrhous stroma with a milky-looking infiltration, were discovered in the diaphragm of a woman, who had previously had her breast amputated.

Syphilitic gummous tumors have been found in the diaphragm; these growths oftentimes extending upwards into the lung, in other instances downwards into the liver. Now and then, both the lung and liver are firmly adherent to the gummous mass. In a woman, who died at the Middlesex Hospital, in November, 1861, of syphilitic disease of the dura mater and liver, there was found a firm and pale-yellow tumor with white septa running through it, the size of half a large orange, imbedded in the substance of the diaphragm. The growth projected downwards, and was inseparably connected with the left lobe of the liver, as well as with the spleen. I know of no means by which such a morbid condition could be detected during life.

Laceration or perforation of the diaphragm has occurred from falls and other accidents; from attempts to suppress the pains of parturition; and

* The Lancet, p. 39. London, January 12th, 1867.

from violent vomiting. It has also taken place in consequence of the extension of suppuration and ulceration from the liver, spleen, or even stomach; from the rupture of an aortic aneurism which had encroached on its texture; from malignant degeneration; from the extension of hydatid cysts upwards from the liver, or downwards from the lungs; as well as from some congenital malformation or cleft becoming unusually strained and so giving way at its border.

Finally, *convulsive action of the diaphragm*, or spasms of the midriff, may prove troublesome, as a mild idiopathic affection, or as a consequence of irritation from morbid action going on in adjoining tissues, or as a result of general exhaustion from disease in distant organs. Hiccup is a curious effect of the sudden and involuntary and momentary contraction of the diaphragm; the glottis being simultaneously narrowed. In vomiting, crying, sobbing, sneezing, &c., there is convulsive action of the midriff; the other muscles of respiration being likewise affected. Moreover, in weakly subjects, long-continued attacks of hiccup, or vomiting, of chronic cough, of dyspnœa, &c., may lead to diaphragmatic myalgia; a painful affection which has been referred to in the preceding section.

PART VII.

DISEASES OF THE ALIMENTARY CANAL.

I. DISEASES OF THE TONGUE.

THE tongue is exposed to many sources of disease and injury. As this organ is abundantly supplied with blood by the lingual, facial, and ascending pharyngeal arteries, it follows that wounds of it are often productive of copious hemorrhage. Being highly sensitive, comparatively slight diseases of its mucous membrane, or of its muscular fibres, are commonly very painful, owing to its free supply of nerves. In each half we find the hypoglossal (motor) nerve, and two nerves of sensation—the gustatory branch of the fifth, and the lingual branch of the glosso-pharyngeal.

1. GLOSSITIS.—Inflammation of the tongue, or glossitis [from *γλῶσσα* = the tongue; terminal *-itis*], is not a very common affection, now that mercury is seldom used so as to produce salivation. The inflammation is generally met with as an accompaniment of other diseases, rather than as an idiopathic affection. Occasionally it leads to the formation of an abscess, which may be mistaken for a tumor until the pus is evacuated.

When glossitis arises idiopathically, it gives rise to fever and mental depression and general weakness. Where it is consequent upon some other affection, great constitutional disturbance may quickly ensue. In all cases the local symptoms are the same, consisting chiefly of pain and swelling and watery discharge. The tongue is found of a deeper red than usual; while occasionally the swelling proceeds to such an extent that the cavity of the mouth is not large enough to contain the organ, and it therefore projects beyond the teeth. This condition, which often occurs very rapidly (sometimes in a few hours), is attended with urgent dyspnœa, and requires prompt treatment. Purgatives should be administered by means of enemata; followed by quinine (F. 379). Ice can be freely applied to the tongue itself with very good effect. Where the œdema is great no practice gives such speedy and certain relief as making one or more longitudinal and free incisions along the upper surface of the organ. By such incisions a quantity of sanguinolent serum drains away, while they let out pus if the morbid action has gone on to suppuration. In the event of suffocation being threatened, owing to the enlargement of the root of the tongue, tracheotomy ought to be performed. Mr. Benjamin Bell saved a patient's life by this operation, in a case of glossitis produced by mercury.

2. ULCERS OF THE TONGUE.—There are several varieties of these ulcers; most of them being exceedingly irritating or painful, and often very difficult to heal.

The whole of the upper part of the tongue sometimes becomes super-

ficially ulcerated, the raw surface feeling heated and tender. Severe and long-continued disorders of the digestive organs are the chief source of this form. The ulceration can only be cured by attention to the diet, particularly forbidding the use of all alcoholic stimulants; by the employment of borax gargles, or by painting the surface frequently with the glycerin of borax and by the administration of such remedies as bismuth, pepsin, quinine, &c.

Where there are ulcerations as the result of simple inflammation, they are usually small and superficial, without definite shape, and very sensitive. They are seated about the tip or near the frænum rather than at the sides of the organ; and they cause great annoyance in eating. They are to be healed by mild diet, antacid aperients, and the application of sulphate of copper; together with the extraction of carious stumps, or the removal of the tartar from any teeth which may be irritating the raw surfaces. Ulcers occurring after ptyalism are easily distinguished by the accompanying affection of the gums and fetor of the breath. They will be most readily cicatrized by the administration of saline purgatives; by a mixture containing chlorate of potash (F. 61); and by the use of a gargle formed of chlorate of potash and tincture of myrrh in water, or of five grains of sulphate of copper to each ounce of water.

Syphilitic ulcers are generally superficial, and are attended with similar disease of the lips or other secondary symptoms. The ulcers appear at the sides of the tongue, are very sore, and are very intractable; while they may be best treated by the mercurial vapor bath (F. 131) every night, or by the inunction of mercurial ointment, or by the green iodide of mercury and conium (F. 53), together with the application of nitrate of silver. The deep syphilitic ulcers usually commence as inelastic indurations, which slough in the centre; the sores then becoming deep and excavated, and the edges ragged and sloughy or thickened and hard. Their most frequent seat is the upper and back part of the tongue. They are accompanied by other tertiary symptoms; and consequently the various viscera should be examined so as to make sure that no gummata are being developed. They are generally cured—at least for a time—by full doses of iodide of potassium (F. 31), and the frequent use of a gargle of one drachm of the dilute nitric acid to eight ounces of water.

The remaining forms of ulcerations are either strumous, tuberculous, or cancerous. They occur for the most part with other symptoms of these affections, while the strumous and tuberculous varieties require the general constitutional treatment proper for these affections, especially cod-liver oil and milk and sea-air.

3. CANCER OF THE TONGUE.—Cancerous disease of the tongue will be of the *Epithelial* form, or it may present the characters of a firm *Scirrhous* tumor, or it now and then proves to be of the *Medullary* kind. Of whichever nature, the disease has a tendency to run on speedily to ulceration, a foul sloughy sore forming with ragged everted edges and an indurated base.

The three chief *symptoms* are, severe pain, profuse salivation, and the cancerous cachexia. At first the patient complains only of a sore tongue, with pain on deglutition, but soon the suffering becomes acute and most wearying, while frequent sharp pangs dart along the Eustachian tube to the ear. The secretion of saliva is very abundant, the fluid either flowing almost constantly from the mouth or passing into the throat and causing an irritating cough. As the ulceration extends (perhaps involving the mucous membrane of the mouth and gums) the discharge becomes most

fetid. The cachexia is early developed, for cancer of the tongue, like that of all the soft vascular tissues, runs a rapid course. The nights are passed in misery; there is pain, with difficulty in articulation and deglutition; there are occasional attacks of hemorrhage, the whole tongue becomes much swollen, while it may even slough, and cancerous deposit takes place in the sublingual and submaxillary glands as well as in the surrounding tissues. Sometimes the mouth becomes almost filled with an extensive ulcerated fungus, so that suffocation may be threatened. But, generally speaking, death occurs from exhaustion.

The *treatment* of these cases is to be conducted so as to relieve pain and support the failing powers as far as possible. Opium in large doses becomes absolutely necessary, and by its judicious use, as already shown (Part I, Section 10), much ease may be given for a time. Bleeding is to be checked by the application of powdered matico leaf, or of a saturated solution of perchloride of iron, or of ice. Fluid nourishment—milk, cream, raw eggs, and essence of beef—must be freely allowed, after the patient finds it impossible to masticate and swallow solid food.

As a curative measure, removal of the diseased parts or of the entire tongue is useless. But excision can justifiably be resorted to, in some exceptional cases, for palliating the symptoms, as where suffocation is threatened from the swelling, when the pain is very intense, when the flow of saliva is so profuse as to keep the patient wet and miserable, or when there are repeated attacks of hemorrhage. That great relief often follows the operation cannot be doubted, and patients (even medical men, fully aware of the inevitable termination of the disease) will sometimes beg for a second operation, in the hope of gaining an extension of ease. Whether the diseased structure should be removed by the knife, écraseur, or ligature, must depend upon the part of the tongue involved and the extent of the morbid action. Unless the whole organ has to be removed the knife is probably to be preferred to the écraseur. The ligature has now been discarded by almost common consent. Several cases have occurred in which the entire tongue has been removed, and the operation recovered from, the patients having subsequently been able to masticate solid food, swallow fluids, and enter freely into conversation without causing any suspicion of the loss they had incurred.

To diminish the sensibility of the tongue and to check the secretion of saliva, Mr. Moore, of the Middlesex Hospital, has recently (1861) repeated the operation of dividing the gustatory branch of the fifth nerve, as first suggested by Mr. Hilton. By section of this nerve between the disease and the brain, relief is immediately afforded, the pains and tenderness, the salivation, and the reflected irritation of the fifth nerve all disappearing. In some five cases the relief was permanent, so far as the gustatory nerve was concerned, though when the disease invaded the area of the glosso-pharyngeal nerve new pain arose. To effect division, Mr. Moore cuts through all the soft tissues on the inside of the ramus of the jaw by an incision immediately behind the last molar tooth, extending three-quarters of an inch in a direction from the angle of the jaw. The structures divided by such an incision are the mucous membrane and a part of the mylo-hyoid muscle with the gustatory nerve descending forward between them, about half an inch from the tooth, and nearly at a right angle with the direction of the incision. It is advisable to operate with a curved knife, as the alveolar ridge might shield the nerve from the edge of a straight one, while it is also necessary to cut outwards quite to the bone. In one instance Mr. Moore combined ligature of the corresponding lingual artery with this operation, so as to diminish the supply of blood to the affected part.

4. CRACKED TONGUE, TUMORS, &c.—*Cracked tongue* is sometimes a troublesome and inveterate affection, rendering eating and speaking very painful. Where there is no specific condition of the system, or no derangement of the alimentary organs to account for it, I have found a lotion of borax and glycerin (F. 268) act very advantageously, as does also one of bismuth, glycerin, and rose-water. Iodide of potassium, with steel or sarsaparilla (F. 31, 32) can likewise be administered, if local remedies fail to effect a cure. Chlorate of potash (F. 61) frequently succeeds. The clefts or fissures may be a couple of lines in depth, and so numerous that they form an irregular series of grooves.

The surface of the tongue occasionally presents *patches of baldness*—that is to say, we find one or more smooth, oval, glossy patches. There is no ulceration or fissure, and the remainder of the surface of the organ looks healthy. This appearance is combined in many cases with psoriasis palmaris; and is probably very often indicative of a syphilitic taint, when it will require a prolonged course of the perchloride of mercury (F. 27) for its cure.

Warts and condylomata are not uncommon diseases of the mucous membrane of the tongue; the former merely requiring excision, while the latter demand the ordinary antisyphilitic medicines. *Papillary patches* are sometimes met with; or, in other words, we find large spots of the mucous and submucous tissue thickened, tough, brawny, coarsely papillary, and perhaps fissured. These patches produce an unpleasant feeling, with thickness of speech; they must not be mistaken for cancer; and they may generally be cured by the administration of the iodide of potassium. When much induration is present, conium, in large doses, appears to be an efficacious remedy in producing softening.

Hypertrophy of the tongue is a rare affection. It is usually congenital. The enlargement generally becomes so great that the mouth is found too small to contain the organ; and a large portion is therefore constantly protruded. In a few instances, the prolapsed part has reached below the chin. Removal will have to be accomplished by the knife, ligature, or écraseur. As the operation is not without danger, attempts have been fruitlessly made to effect a cure by continued pressure.

When the frænum linguæ extends to the very tip of the tongue, the individual is said to be *tongue-tied.* This condition is by no means so common in infants as the public imagine. Where it really interferes with the movements of the organ, the frænum should be divided; the points of the scissors being directed downwards, to avoid wounding the ranine arteries.

Encysted or *fatty tumors* form in the tongue or beneath it, and may require extirpation. *Firm tumors*, made up of fibrous and areolar tissue, have been found in a few rare instances growing from the tongue. When pediculated they had better be snipped off. There is no fear of hemorrhage, unless an artery can be felt in the stalk; in which case the écraseur should be used. *Abscesses* are very seldom met with in the tissue of the tongue. When they occur, a free incision must be made to evacuate the pus.

Nævus of the tongue is most times congenital. Even though half the organ be involved, surgical interference is seldom necessary. Some years since, I saw a youth the whole of whose tongue seemed to be covered with small tortuous veins, which have contracted with time. In the event of repeated attacks of hemorrhage extirpation by ligature may possibly be needed.

And lastly, *Ranula* [*Rana* = a frog; because the voice is said to be croaking, like a frog's] is a semi-transparent fluctuating swelling, perhaps

as large as a walnut, situated under the tongue. It consists of a dilatation of the duct (Wharton's) of the submaxilliary gland. A seton should be passed through the cyst, or a portion of the anterior wall can be excised.

II. INFLAMMATION OF THE MOUTH.

Stomatitis [Στόμα = a mouth; terminal *-itis*], or inflammation of the mouth, is a common disease in young children. It may occur in three forms—*i. e.*, according as the principal seat of the morbid action is situated in the mucous follicles of the mouth, the substance of the gum, or in the tissues of the cheek.

1. FOLLICULAR STOMATITIS.—Inflammation of the mucous follicles of the mouth—the aphthous stomatitis of some authors—is the mildest form of stomatitis. It may be idiopathic, or it may occur as a sequela of some of the eruptive fevers—as measles, &c. The attention is first directed to the child's mouth, by observing that a difficulty seems to be experienced in sucking, that there is a more free secretion of saliva than usual, and that the submaxillary glands are tumid and tender. The patient is also restless and feverish, has but little appetite, seems to experience pain in deglutition, and frequently suffers from diarrhœa with very offensive evacuations. On examination, numerous small vesicles are found about the inside of the mouth, on the tongue, and on the fauces; which vesicles by bursting form little ulcerations covered with a dirty white or yellowish slough. These ulcerations sometimes remain separate, though more commonly they coalesce, forming a sore of considerable extent. In either case, as they heal, fresh vesicles appear, which again degenerate; and so the morbid action may continue for some weeks. When follicular stomatitis occurs as a concomitant or sequela of measles, it may become associated with diphtheria and produce an alarming malady.

For the greater number of cases very simple *treatment*, such as that presently to be recommended for thrush, suffices to effect a cure.

2. ULCERATIVE STOMATITIS, OR NOMA.—This disease attacks the gums; the ulceration sometimes progressing to such an extent as to destroy these parts and denude the teeth.

Noma [Νέμω = to corrode], or water-canker, produces heat of the mouth, an increased flow of saliva, offensive breath, swelling of the upper lip, and enlargement with tenderness of the submaxillary glands. On looking into the mouth, we shall see that the gums are swollen, red or violet-colored, readily bleeding to the touch, and covered with a layer of pulpy gray matter. If the disease be allowed to creep on unchecked, the gums will get destroyed by the ulceration; the teeth becoming exposed and loosened until they fall out. The morbid action also spreads to the mucous lining of the cheeks, which becomes covered with irregular sloughing ulcerations; while the tongue assumes a swollen and sodden appearance. Ulcerative stomatitis is not uncommon among the poor. It occurs for the most part in weakly children (between one and eight years of age) who have been badly nourished, and exposed to cold and damp.

The *treatment* of this disease is not difficult, inasmuch as we possess in the chlorate of potash a remedy which may almost be deemed a specific.

Five grains of this salt ought to be given every four or six hours to an infant one year old, in a little sugar and water. Pure milk and good broths will also be required. When the ulcerations have healed, bark or quinine should be administered.

3. GANGRENOUS STOMATITIS.—Gangrenous stomatitis, or cancrum oris, or sloughing phagedæna of the mouth, is a much more formidable affection than either of the foregoing. It is met with in children of debilitated habits between the ages of two years and five or six.

The *symptoms* are generally these: The child is out of health and evidently weak. There is loss of appetite, wasting, and restlessness. The child dribbles at the mouth; the gums are swollen and covered with specks of ulceration; while there quickly forms, on one cheek, a hard indolent swelling. On examining the cavity of the mouth, a whitish or ash-colored eschar is seen in the centre of the cheek, which gradually increases until the slough has spread over the whole of the interior of the cheek, lips, and gums. The saliva is copious and horribly fetid. Supposing the destructive action to continue, either perforation will occur or the entire cheek may become gangrenous. The alveolar processes are very likely to get involved, and ultimately to exfoliate. Of course with all this there must be great constitutional disturbance. Now and then a low form of inflammation attacks the peritoneum and mesenteric glands. Pulmonary complications are very apt to arise. The exhaustion rapidly becomes extreme, and the disease frequently ends fatally. The severe morbid action has often been unjustly attributed by the child's parents and ignorant nurses to the action of mercury, but it may occur when not a particle of this medicine has been given.

The *treatment* had better consist in the application of the nitrate of silver—in some instances of the strong nitric acid—to the slough; in frequently syringing the mouth with solutions of chloride of zinc (F. 79), or of chlorinated soda (F. 254), or of the permanganate of potash (F. 78), and in the free administration of strong beef tea, pure milk, raw eggs or cod-liver oil, wine or brandy, and the chlorate of potash in decoction of bark.

The effect of mercury upon the gums and teeth varies according to the age and constitution of the recipient. Young children are certainly less susceptible to the injurious influence of this metal than adults; but cases are occasionally met with where great mischief has been produced, even in infants, by a mercurial course. Gray powder is unfortunately believed by the public to be the panacea for all infantile disorders, and hence it is administered on many occasions with great impropriety. Teething powders are largely sold, even amongst the intelligent portion of society; much illness resulting from their use in young children who would cut their teeth safely and almost painlessly, if parents could but be persuaded to cease their mischievous interference with a simple natural process. I have seen such severe inflammation of the gums (*gingivitis*) thus set up by the administration of some mercurial preparation, that the child could not venture to take the nipple into its mouth, while it has been rapidly wasting for want of food. Sometimes the gums and buccal mucous membrane become the seat of a widespread ulceration, with all the symptoms of cancrum oris. Where such violent action does not ensue, great mischief may yet be done to the teeth about to be cut; so that as they are shed they become dark-colored, brittle, and very liable to rapid decay. The mischief, however, does not cease with the temporary teeth, the permanent ones being also affected, though perhaps in a less degree. It has seemed to me doubtful whether the iodide of potassium is of any use in these cases. Not unfre-

quently, when the child is first seen by a competent practitioner, there is so much exhaustion that all his endeavors have to be directed to maintaining life, and therefore recourse is had to small doses of brandy, to the restorative soup (F. 2), and to milk or cream, leaving the elimination of the mercurial poison to time.

III. APHTHÆ OF THE MOUTH.

Aphthæ [from Ἅπτω = to fasten upon] consist of small, round, white, elevated specks or patches, scattered over the tongue and lining membrane of the mouth. Every now and then these patches extend down the œsophagus into the stomach. They form a special disorder in infancy—*the thrush;* in adult age they are apt to arise in the course of other affections, when they are often the harbingers of death. In at least some forms of this disease, microscopical parasitic plants (the *Leptothrix buccalis* and the *Oidium albicans*) become developed in large quantity in and between the epithelial cells of the mucous membrane; the filaments and spores of these fungi rendering the epithelium friable, loose, and swollen. They are readily transferred from the infant's mouth to the mother's nipple. When the aphthous spots are abundant they will frequently coalesce, producing a dirty diphtherial-looking membrane. The chief general symptoms are restlessness, depression, difficulty in swallowing, cough, diarrhœa, and vomiting.

The *treatment* of the thrush consists in the use of mild astringents and tonics, and the application of borax and glycerin (F. 250) to the aphthous parts. A gargle of infusion of catechu, with or without a little borax, often answers capitally. The diet must be regulated, such nourishing food as is compatible with the age being freely allowed. Sir William Jenner states that in cases attended with the formation of parasitic plants, the application of a solution of sulphite of soda (sixty grains to one fluid ounce of water), suffices to remove the disease from the mucous membrane of the mouth in twenty-four hours. The secretions of the mouth being acid, the salt becomes decomposed, and sulphurous acid is set free, which at once destroys the parasite.

IV. INFLAMMATION OF THE PAROTID.

Cynanche parotidea [from Κύων = a dog + ἄγχω = to strangle: Παρά = near + οὖς = the ear], or parotitis, or the mumps, is a specific contagious inflammatory affection of the salivary glands, and of the parotid gland especially. It first manifests itself by slight febrile disturbance, with tumefaction and soreness in one or both parotid regions; the swelling usually extending from beneath the ear along the neck to the chin, and involving the submaxillary glands. The disease reaches its height in four days, and then declines. Very rarely, the inflammation runs on to suppuration. Occasionally, during or after the decline, the testicles or mammæ become painful and swollen.

When orchitis has occurred during the prevalence of mumps it has usually been considered as the result of metastasis. In an epidemic of catar-

rhal fever, however, described by M. Desbarreaux-Bernard, of Toulouse, to which the prevalence of mumps imparted a peculiar character, this explanation could hardly be adopted; inasmuch as in several patients the affection of the testes appeared at once, without any preliminary affection of the parotid whatever. The testitis came on during the catarrhal fever; the pain, however, being only slight, and the tumefaction assuming a globular form. Individuals of all ages were attacked; and several of these were already patients in the hospital, suffering or convalescent from various serious diseases.

The *treatment*—where any is necessary—consists in the employment of milk diet and gentle laxatives, mild diaphoretics, and hot fomentations (or merely flannel) to the throat.

V. INFLAMMATION OF THE TONSILS.

Cynanche tonsillaris, or tonsillitis, or quinsy, or common inflammatory sore throat, manifests itself by fever and pain and considerable swelling of the tonsils.

The disease is often ushered in by chilliness or a rigor, which is followed by smart fever. On examination there will be seen considerable redness and swelling of the fauces and tonsils; these parts being at first shiny-looking, and then covered with mucus. The tongue is thickly coated; while there is an annoying discharge of viscid saliva. Complaint is made of the return of liquids through the nostrils on attempting to swallow, and of the difficulty of deglutition; together with (in severe cases) pain shooting from the throat to the ear, along the course of the Eustachian tube. Dyspnœa is but rarely present. The nights are sleepless. Under ordinary circumstances, the inflammation runs an even course, and terminates by resolution in a few days; merely leaving the tonsils temporarily swollen, or permanently enlarged. When violent and prolonged, however, the morbid action frequently leads to suppuration in one or both of the glands. Rigors generally announce the suppuration; the pain proving very severe until the abscess bursts, or is opened artificially.

The principal exciting cause of quinsy is cold. The liability to it is increased, during the youthful period of life, by repetitions of the attacks. It is doubtful whether it be contagious or not; but most practitioners assert that it is not.

The *treatment* required is usually very simple. The patient had better remain in bed, and breathe warm air not too dry. Milk and good broths are to be allowed. A few doses of some cooling saline purgative, and the application of hot fomentations or linseed poultices to the throat will almost be all that is necessary. The steam of poppy-water directed to the fauces gives great relief; and I have frequently found benefit from opiate gargles (F. 253). The inhalation of spray medicated with belladonna, or conium, or opium (F. 262), can also be recommended. Patients vary in opinion as to the ease afforded by sucking ice, in place of the hot applications. Blistering the outside of the throat, or the application of stimulating embrocations—as the compound camphor liniment—has seldom done any good in my hands; and I much prefer using freely the extract of belladonna, and applying a large poultice over it. Guaiacum in large doses has been recommended as a specific in quinsy, but I have never found it of much service. Ammonia and bark (F. 371), or quinine and some mineral acid (F. 379), have appeared to me of far greater value.

When the inflammation has gone on to suppuration, it is generally thought necessary to open the abscess. My own opinion, however, is that in nine cases out of ten it will be much better to let the abscess burst. If interference be determined on, care must be taken to puncture the tonsil with a sharp-pointed curved bistoury, the cutting edge of which is to be directed towards the mesial line of the body; for it has on several occasions happened that an awkward and unskilful operator has, by inattention to this rule, wounded the internal carotid artery. Should such an accident happen, the officinal strong solution of the perchloride of iron must be quickly and freely applied to the wound; this excellent styptic having arrested the hemorrhage in a case where, had it failed, a ligature would have been placed on the trunk of the common carotid artery.

Permanent enlargement and induration of the tonsils may result from acute inflammation; or this state can come on slowly in strumous or rickety children, as well as in weakly youths and young women. The enlargement is often so great, that the fauces appear to be almost blocked up; while it produces thickness of speech, more or less deafness, an uncomfortable sense of obstruction, and some difficulty in swallowing. Occasionally the swollen glands seem to prevent full and deep inspirations. Portions of the hypertrophied organs had then better be excised, if the applications which have been recommended (p. 435) fail to effect a cure. Mr. W. J. Smith has attempted to revive the method of cauterization by potassa fusa; but the proceeding must be much more dilatory and uncertain than excision with the knife and vulsellum forceps, while it possesses no countervailing advantages.* As regards constitutional remedies, steel and quinine, or iodide of iron, can be tried. Cod-liver oil is often very useful, particularly if taken perseveringly at the seaside for many weeks.

Cancer of the tonsil is very seldom seen. The only case which has been brought under my own observation occurred in the practice of Dr. Burnett, of Biggleswade. The patient was a poor woman sixty-eight years of age, whose pharynx was much obstructed by a firm medullary cancer of the left tonsil. The diseased mass was completely excised by Dr. Burnett, but I believe with only very temporary relief.

VI. DISEASES OF THE PHARYNX AND ŒSOPHAGUS.

The coats of neither the pharynx nor the œsophagus are as subject to disease, as the position and office of the musculo-membranous tube which they form might lead us to expect. Occasionally, however, this canal becomes the seat of cancer, or of inflammation leading to stricture. A nar-

* Richard Wiseman, Serjeant-Chyrurgeon to King Charles the Second, recommended the treatment of enlarged tonsils "by Extirpation: and that either by Abscission, at once cutting them off: or by actuall or potentiall Cautery. . . . The first Chirurgeon in my memory that attempted the Extirpating them was the late deceased Mr. *Ed. Mol.* an excellent operator. He attempted it upon a Person of Honour by actuall Cautery through a *Cannula* well contrived for that purpose. I afterwards saw him burn severall. He passed the Cautery through the body of them, and by repeating of it twice or thrice he burnt a hole through them, and accordingly crimpled them up. . . . . The way by potentiall Cautery is, by working with a Caustick-stone and other Escaroticks fixt in such an instrument as may serve to eat into them, without offending the neighbouring sound parts. To which purpose I make my way into the body of the gland, consuming it within; and at last the shell (or exterior parts) falls in pieces, and is so eradicated." Several Chirurgical Treatises, &c. Second edition, pp. 329, 330. London, 1692.

rowing of the passage may also result from simple spasmodic contraction, but then it is only temporary; or from the pressure of aneurismal or intra-thoracic tumors; as well as from destruction of the mucous membrane and the effusion of a fibrinous material into the submucous areolar tissue, the consequence of swallowing the strong mineral acids or caustic alkalies. I have seen only one instance in which inflammation and ulceration occurred, followed by stricture, without any appreciable cause.

Disease of the pharynx and œsophagus is attended by one prominent symptom—dysphagia [$\Delta\upsilon\varsigma$ = difficulty + $\phi\acute{\alpha}\gamma\omega$ = to eat]. Difficulty in swallowing will likewise arise from tonsillitis, diphtheria, and croup; from that very uncommon affection polypus of the pharynx; from erysipelatous or other inflammation of the areolar tissue of the neck, or from retro-pharyngeal abscess; from paralysis of the muscles of deglutition; from malignant, syphilitic, and tubercular ulcerations about the epiglottis; from spasm of the pharynx and œsophagus, as in hydrophobia; from inflammation, ulceration, or œdema of the larynx; and rarely from disease of the laryngeal cartilages.

1. DISEASES OF THE PHARYNX, &c.—Every now and then, especially among the inmates of hospitals and workhouses, the walls of the pharynx become affected with a *diffused erysipelatous inflammation.* There is generally low fever, with rapidly increasing prostration. A muttering dreamy wandering of the mind is common; the occurrence of violent delirium being exceptional. Ammonia and bark (F. 371), wine or brandy, and good fluid nourishment must be allowed very freely. A dose of opium sometimes does good. The morbid action will perhaps run on to sloughing, or the patient may die from exhaustion without great care.

Extensive syphilitic ulceration of the velum and fauces has in a few instances, after healing, produced narrowing and contraction of the upper part of the throat to such a degree as to impede deglutition and to obstruct respiration. It might, perhaps, happen in some particular case that incising the edges of the contracted opening would afford sufficient relief; but most frequently real and permanent benefit will only result from tracheotomy. In one case the tracheal tube was worn with great comfort for eight years. Deglutition had to be slowly and cautiously performed, great care being required to masticate solids very finely.

Partial or complete *adhesions of the velum to the posterior walls of the pharynx, with destruction of the uvula,* are more common than the foregoing; but they give rise to little or no difficulty in breathing or swallowing, though they cause discomfort.

Elongation of the uvula may be the result of chronic inflammation, or of a generally relaxed state of the fauces. By irritating the pharynx and epiglottis the hypertrophied uvula produces an inclination to vomit at times, with a troublesome tickling cough. If astringent gargles and ferruginous tonics fail to reduce the size of this organ, about two-thirds of it should be snipped off.

In some cases of stammering I have found a congenital malformation of the uvula present; but this state has probably exerted no influence on the impediment in the speech. As a rule, it will be unwise to interfere surgically with such a structure.

2. RETROPHARYNGEAL ABSCESS.—This is a disease which only comes under observation once in a way. It is more frequently met with in children than adults. To Dr. Fleming is due the credit of first clearly

describing this form of obscure suppuration, and of showing that it sometimes occurs during infantile life.*

Pathology.—The abscess is the result of acute or chronic inflammation of the loose connective tissue situated between the posterior surface of the pharynx and the muscles on the anterior part of the spine. It may result from direct injury, or it will be the consequence of some general or specific constitutional derangement. Chronic abscesses in this situation are often connected with the strumous diathesis, and are of the same nature as the suppurations which take place in the cervical glands. Perhaps, also, the mischief is more or less closely connected with a slight syphilitic taint. The inflammatory action often commences in a lymphatic gland at the back of the pharynx. In weakly subjects there is a fear that the inflammation will extend and produce œdema of the glottis.

Symptoms.—The characteristic symptoms are preceded by general disturbance and fever, varying in intensity according to the constitution of the child. In almost all cases there is derangement of the cerebral and respiratory and circulating systems. At the commencement we find some amount of nausea, and soreness of the throat. Indications of difficulty in swallowing and breathing then manifest themselves; the latter soon becoming so severe, particularly when the child is placed in the recumbent posture, that suffocation may even appear imminent. There is also a fixed and retracted state of the head, with rigidity of the muscles at the back of the neck; a more or less locked state of the jaws; and a remarkable articulation—in children old enough to speak, the words being drawled out with pain and difficulty. The painful deglutition increases, until it is found that solids are refused and liquids regurgitated through the nose; frequent spasmodic attempts are made to swallow, as if there was something in the mouth; and there will possibly be convulsions, or stupor sometimes amounting to complete coma. Death has occurred from the abscess pressing the pharynx forwards on the epiglottis and rima glottidis, and causing suffocation. On examining the fauces, a firm and projecting round tumor is felt just beyond the base of the tongue, occupying either the median line, or inclined to one or other side. The abscess sometimes occurs as a sequela of fever; but usually it is idiopathic.

Diagnosis.—Without caution the symptoms are likely to be attributed to some cerebral affection, or to disease of the cervical vertebræ, or to inflammation of one of the respiratory organs. Attention to the phenomena just described, noting the cessation or diminution of the difficult breathing when the patient is raised from a recumbent to a sitting posture, with a careful examination of the throat, will remove all doubt as to the true nature of the case.

Treatment.—Surgical interference gives immediate relief, and soon effects a cure. The abscess must be opened with a bistoury, shielded to near its point by lint or plaster. The head ought to be steadied, during the operation, by an assistant; who is to press it well forwards directly the puncture is made sufficiently free, so as to facilitate the escape by the mouth of the pus which gushes out. A spontaneous opening but rarely occurs. And could we trust to its taking place, there would be a fear that the abscess bursting suddenly, air and pus might be inspired into the trachea, producing suffocation.

3. DISEASES OF THE ŒSOPHAGUS.—*Simple ulceration of the œsophagus* is a peculiar disease, the pathology of which is obscure. The chief

* The Dublin Journal of Medical Science, vol. xvii, p. 41. Dublin and London, 1840.

the ounce); or painting the part night and morning with equal urpentine and glycerin; or the employment of spray inhalations, l with tannic acid or borax or iodine (F. 262). Ice should be l frequently sucked. Amongst the constitutional remedies most of trial are bark and quinine and steel, iodide of potassium, cod- a very nourishing diet, and sea air. I have little doubt that life ve been saved in some of the recorded cases where death was due arvation, by the formation of a gastric fistula in the manner pres- e described.

of the œsophagus takes place at any one part of the tube, or ts whole length and circumference. The disease will be of the or medullary, or epithelial variety; the latter probably being mon than either of the other forms. When it occurs as a primary distant organs are but rarely implicated in the cancerous affec- ibly because of the rapidity with which it destroys life. Most fatal considerably within a year from the commencement of the s. Sometimes the disease has spread from the larynx to the s. Thus, a patient with cancer of the larynx will perhaps have to tracheotomy to avoid asphyxia from obstruction of the glottis. r several months with a tube in the windpipe, the malignant may extend to the pharynx or œsophagus. Death will possibly be morrhage, or to apnœa caused by food passing through the false nto the bronchi.

mptoms of œsophageal cancer at the onset are obscure. Com- at first made, somewhat suddenly, of sore throat and difficulty in g. In one case under my observation the patient was much y a curious cutting pain in the ears, which symptom preceded the .* The disease soon gives rise to decided obstruction, so that ne not a particle of nourishment can be naturally passed into the

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ther instance (seen during the summer of 1864, in consultation with Mr. f Philpot Lane, Fenchurch Street), the only symptoms through the prog- disease were constant sickness and increasing emaciation. The former

stomach, while just above the constriction there is often formed a pouch where food accumulates until it is rejected. There is also considerable pain in the canal, or in the back, or in the shoulders; nausea and retching may be most troublesome, and irritating cough and hiccup are not uncommon. The patient wastes rapidly and to a wonderful extent, while the cancerous cachexia becomes plainly established. Death has occurred from hemorrhage, one of the intercostal arteries having been laid open by the extension of the disease, or fatal loss of blood has taken place from the spreading of the ulceration through the coats of enlarged veins. In other instances the patient has sunk from sheer starvation,—inanition; or from the ulceration involving important parts, or from destructive inflammation of the lung, owing to the implication of one of the pneumogastric nerves. We can only hope to give temporary relief by the use of opium and nutrient enemata, or by very cautiously passing a large gum-elastic catheter (No. 14 is a convenient size) through the contracted œsophagus, keeping the instrument there as long as it can be tolerated, and injecting food, &c. through it.

Simple stricture of the œsophagus is generally an after-consequence of the attempt to swallow some corrosive poison. Dr. Basham has recorded* a very interesting example, which well shows the course of events in these cases: A young woman, twenty-two years of age, accidentally swallowed a very small quantity of soap-lees (a caustic solution of impure carbonate of soda). When admitted into the Westminster Hospital, five days subsequently, she was suffering principally from vomiting; this was relieved by calomel and opium, oleaginous laxatives and demulcents, milk and farinaceous diet, and by a blister to the throat and upper part of the sternum. An œsophagus-tube passed easily. Ten days after her admission she was discharged apparently well. At the end of eleven months she was again admitted, suffering from urgent dysphagia. She appeared half starved, and stated that for many weeks no solid food had been taken, and that lately the difficulty of swallowing had become so great that she could hardly get down liquid nourishment. A small gum-elastic catheter, No. 8, was introduced with a little difficulty, and beef tea was injected into the stomach, to the great relief of the patient. This plan of treatment was continued, a larger tube being gradually used, while in a little more than twenty days so much improvement had taken place that she was able to swallow freely, and was therefore made an out-patient. She neglected to attend, however, and consequently eighteen days afterwards was readmitted with her former symptoms aggravated. The same treatment was again successfully resorted to, and she was kept under longer observation by employing her as an hospital nurse. She was afterwards lost sight of for a time, but in about eight months—or twenty-six from the accident—she again, for the fourth time, applied, and was admitted. Only the smallest bougies could now be passed; nutritious enemata were employed, but in a few days she died, literally of starvation.

In the management of these cases we should rely on the repeated use of bougies to prevent the stricture from closing. It will not do to trust to the chance of the progress of the contraction being spontaneously arrested while there is yet room for pultaceous nourishment to pass through the canal. The consequences of neglect are too serious to justify recourse to expectant treatment. The stricture must be gradually dilated, and then prevented from recontracting if possible, by the employment of a large

* Medico-Chirurgical Transactions, vol. xxxiii, p. 99. London, 1850.

ugie every ten or fourteen days for many months. One lady under
derived relief from constantly wearing a gum-elastic catheter of a
ze, through which she injected her food and medicines. As she had
upper incisor teeth, the instrument was allowed to project just in
the lips, where it caused little or no inconvenience. While pass-
instrument great caution ought to be exercised, for in one instance
l that an eminent surgeon forced a tube through the stricture into
racic cavity, and then injected half a pint of beef tea into the pleura.
er, if it be necessary to employ force the superior laryngeal branch
neumogastric may be injured, severe pneumonia being set up from
ritation. In one or two instances at least, death has resulted from
rity of the inflammation thus originated.

regard to almost hopeless examples, two or three suggestions can
e. Thus, it may very properly be a question whether the constric-
ght not be overcome by the judicious use of potassa fusa, as employed
Wade for curing stricture of the urethra. This proceeding not
ng feasible, it would have to be determined whether the œsophagus
uld not be opened below the contraction by a cautious dissection
gotomy or pharyngotomy) at the side of the neck. Such an opera-
s been resorted to successfully for the removal of foreign bodies—
ragments of bone, plates of false teeth, &c. The only reported case
ich I am acquainted where the gullet has been opened for the relief
ure so as to allow of the introduction of food into the stomach, was
n with obstruction from tuberculous deposit. The operation was
ed by Dr. John Watson, surgeon to the New York Hospital, on
ry 12th, 1844, and the patient lived in comparative comfort until
th.*

here are cases where the stricture is situated too low down to be
by incisions at the side of the neck. Often the contraction is at
rt of the œsophagus where the tube passes through the diaphragm.
then become a question whether an incision ought to be made into
nach large enough to enable us to introduce food. A reply in the
tive has been returned more than once. In one instance of malig-
ricture of the œsophagus gastrotomy has been actually performed,
ient dying forty-five hours afterwards. I think there has also been
d unfavorable instance. Considering the immediate risk of opening
nach, and the certainty of only at the best being able to postpone
ort time a painful death, I should feel averse to sanctioning such
ation in a case of cancer. It would, however, be a different matter
nstance of incurable simple stricture, for the well-known case of
St. Martin (not to mention some five or six others where the stomach
n opened to remove knives which have been swallowed accidentally
osely) seems to show that such treatment might be successful. I
ined to recommend, however, that instead of making a communica-
tween the stomach and external surface with the knife, a strong
—*e. g.*, potassa fusa—should be employed; through the agency of
we could gradually excite inflammation, adhesion, and ulceration.
sibility of such a proceeding seems to be proved by a case recorded
Murchison.† In this instance a woman produced a large opening
the abdominal parietes and gastric walls by means of long-con-
pressure with a penny-piece. The ulcerative process was completed,

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erican Journal of the Medical Sciences, vol. xxxiv, p. 309. Philadelphia,

lico-Chirurgical Transactions, vol. xli, p. 14. London, 1858.

so that food escaped from the stomach, on March 2d, 1854; yet the patient was in tolerable health, with the fistula large enough to admit three fingers, in June, 1858.

The œsophagus may, like the urethra and bronchial tubes, suffer from *spasmodic stricture*. Young hysterical women are often affected with it; the principal symptoms consisting of difficulty in swallowing, an occasional sense of fulness and choking, languor, anæmia, &c. Spasmodic cannot be confounded with organic or permanent stricture, because the dysphagia is only temporary, a bougie passes with very little or no difficulty, and the symptoms are aggravated when the patient's attention is directed to them. Moreover, it may generally be readily relieved by antispasmodics (F. 88, 89); or by some tonic like the valerianate of quinine (F. 93); or by the phosphate of zinc (F. 414). The daily use of the cold shower-bath is serviceable. Any general or uterine disorder which may be present ought also to be cured.

A curious nervous condition termed *œsophagism* is closely allied to the foregoing. It arises thus: A woman puts some five or six pins into her mouth, has her attention drawn off for a moment, and then erroneously believes that she has swallowed one. Or a nervous individual, perhaps while eating fish, is suddenly spoken to. He is startled, makes a gulp, and fancies he has swallowed a small bone which is sticking in the gullet. As the irritation increases he seeks advice. But the medical man may be misled by trusting to the patient's symptoms; or feeling, with the fingers in the throat, the upper edge of the cornu of the os hyoides, he is apt to mistake it for a foreign body. A careful investigation with the finger or the laryngoscopic mirror, or the cautious passage of a full-sized bougie, should prevent any error in diagnosis. The nervous sensation may, however, produce dysphagia, and will perhaps continue for weeks. A full dose of opium at bedtime has sufficed to stop it. Quinine, valerianate of zinc, and galvanism, are the remedies to employ in obstinate cases. The way in which this error was overcome in former days is shown in the *Essaies* of old Montaigne, first published in 1603.* He says: "A woman fancying she had swallowed a pin in a piece of bread, complained of an intolerable pain in her throat, where she thought she felt it stick; but an ingenious fellow that was brought to her, seeing no outward tumor nor alteration, supposing it only to be a fancy taken at some crust of bread that had pricked her as it went down, caused her to vomit, and unseen threw a crooked pin into the basin, which the woman no sooner saw, but believing she had cast it up, she presently found herself eased of her pain."

VII. DYSPEPSIA.

Dyspepsia [$\Delta\upsilon\varsigma$ = difficulty + $\pi\acute{\epsilon}\pi\tau\omega$ = to digest], or Indigestion [*In* = neg. + *digero* = to concoct or digest], is one of the most common diseases we have to treat. Anything which interferes with the healthy action of the stomach and intestines may give rise to it.

Pathology.—There is a *gastric* and an *intestinal* digestion. The first

* The Works of Montaigne, edited by W. Hazlitt. Third edition, p. 38. London, 1853.

occupies on an average from two to three hours, and it essentially consists of an exposure of the food to the solvent powers of the gastric juice. This fluid is composed of water holding in solution hydrochloric and perhaps lactic acid, most of the salts which are found in the liquor sanguinis, and an albuminous matter absolutely necessary to the solvent powers of the juice—whence it is named "pepsin," or "ferment substance." Moreover, it is always diluted with saliva; sometimes there is an admixture of bile. The object of the gastric juice is to render soluble the albumen, fibrin, casein, &c. (the albuminoid matters), submitted to the stomach, and this it effects by a catalytic action,* converting them into a new organic and non-coagulable substance, which has been called "peptone." Of this peptone part is probably at once absorbed, and mingles with the blood, while the remainder, with the fatty substances of the food, passes onwards into the duodenum, &c., to be acted upon by the biliary, pancreatic, and intestinal secretions. The conversion of starch into sugar is commenced in the mouth, by the power of the secretion of the several salivary glands; but whether it is completed in the stomach, or whether its conversion there is delayed to be again renewed in the duodenum, is uncertain. According to M. Lucien Corvisart the pancreas is to be regarded as a supplementary organ to the stomach, so that those matters which escape gastric digestion become quickly acted upon in the duodenum by the pancreatic juice. The quantity of the pancreatic juice secreted in the twenty-four hours has been estimated at seven or eight ounces avoirdupois; but though it is so much less than the gastric juice (which according to Dr. Draper amounts to seventy ounces), yet its fermentive matter is said to be ten times more effective. It of course follows from this, that we have a duodenal dyspepsia caused by vitiation of the pancreatic juice, just as we may have gastric dyspepsia.

Causes.—The most frequent causes of dyspepsia are the use of food in too large a quantity and of an improper nature, or the consumption of it at irregular times, or the imperfect mastication of it from carelessness, or hurry, or owing to the pain of bad teeth, &c. Dr. Beaumont clearly proved, in his well-known experiments on Alexis St. Martin, that spirituous liquors were most injurious to the stomach, whence persons in the habit of using them often suffer from indigestion. The drinking of too much fluid of any kind at a meal must be mischievous, by overdiluting the gastric juice. Another cause of indigestion, is an error frequently committed of not allowing a sufficient interval between the meals, to permit of the stomach doing its work and resting; the rule that five or six hours should intervene between each meal, cannot be long broken with impunity. Want of bodily exercise, excessive labor, inordinate intellectual exertion, mental anxiety, general debility, the constant use of narcotic drugs, immoderate smoking, and snuff-taking, are fruitful sources of this affection, while of course disease of the mucous membrane or of the muscular coat of the stomach, and derangement of the liver or pancreas, will also give rise to it. So, likewise, morbid states of the brain, lung, liver, or uterus may, by reflex action, produce functional gastric disorder, attended with most troublesome vomiting. Again, where the blood is rendered impure from any morbid poison in the system, as that of fever, cholera, pyæmia, &c., we find the functions of the stomach destroyed, while this organ will retain nothing in advanced Bright's disease when the blood is contaminated with retained urea owing to the imperfect action of the kidneys.

* Catalysis [from Καταλύω = to dissolve or loosen]. Catalytic force is that property by which a body resolves other bodies into new compounds by mere contact or presence, without itself experiencing any modification.

The nervous irritability of many literary and scientific men has its origin in dyspepsia. Sedentary pursuits with overmental labor cause disorders which speak by the stomach in the first instance. The truth is, unfortunately, that one man may injure his constitution by excessive devotion to good work almost as readily as another may do so by dissipation. It would be well if Bacon's suggestion could be acted up to,—"that we make application of our knowledge to give ourselves repose and contentment, and not distaste or repining." But in these days, hard labor and scant repose are the conditions under which those who aspire to teach their fellow-men must be content to live.

Symptoms.—The symptoms of that functional derangement of the stomach which is commonly known as indigestion, vary very much in nature and severity, one individual suffering severely when his dinner "disagrees" with him, while another has merely slight depression. But in the chronic cases for which advice is sought, there will usually be anorexia or loss of appetite, a sensation of pain, weight, and fulness at the epigastrium, flatulence or the undue formation and collection of gas in the intestinal canal, nausea and vomiting, costiveness alternating with diarrhœa, acidity, furred tongue, and foulness of the breath, palpitation of the heart, a weak pulse, and a sense of oppression about the chest, pain around the loins, and aching of the limbs, with dull headache, vertigo, neuralgia, an inability for exertion, and hypochondriasis. Occasionally the patient complains of *gastralgia* [*Γαστὴρ* = the stomach + *ἄλγος* = pain] or *heartburn;* of *gastrodynia* [*Γαστὴρ* + *ὀδυνή* = anguish] or *cramp in the stomach;* or of *pyrosis* [*Πυρόω* = to set on fire] or *waterbrash*, which consists in the frequent eructation of a thin and watery and acid or tasteless fluid. Pyrosis occurs more frequently in women than men; it is not uncommon in advanced life, and it often exists in connection with some derangement of the nervous or uterine system, or with organic disease of the stomach, or pancreas, or liver.

The consequences of *slow digestion* from a scanty secretion of the gastric juice, are—feelings of fulness and distension in the left hypochondrium as well as at the pit of the stomach, after taking food; flatulence, with fetid eructations, constipation, a coated tongue, and loss of appetite; palpitation of the heart, irregularity of the pulse, headache, and occasionally dimness of vision; with distressing mental depression. When the stomach becomes greatly distended by gas, oppression of the breathing is often produced; owing to the descent of the diaphragm being impeded. The low spirits induced by gastric irritation may vary from slight dejection and ill-humor to the most extreme melancholy; the latter sometimes inducing even a disposition to suicide. The patient misconceives every act of friendship, he is irritable with those who desire to serve him, while he exaggerates slight ailments into heavy grievances.*

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* A humorous sketch of these dyspeptic miseries and their consequences, which may claim attention by the way, was drawn by Sydney Smith in his customary shrewd manner. He says: "Happiness is not impossible without health, but it is of very difficult attainment. I do not mean by health merely an absence of dangerous complaints, but that the body should be in perfect tune—full of vigor and alacrity. The longer I live the more I am convinced that the apothecary is of more importance than Seneca; and that half the unhappiness in the world proceeds from little stoppages, from a duct choked up, from food pressing in the wrong place, from a vexed duodenum, or an agitated pylorus.

"The deception, as practiced upon human creatures, is curious and entertaining. My friend sups late; he eats some strong soup, then a lobster, then some tart, and he dilutes these esculent varieties with wine. The next day I call upon him. He is going to sell his house in London and to retire into the country. He is alarmed for his eldest daughter's health. His expenses are hourly increasing, and nothing

In some cases of nervous gastric disturbance the appetite is exaggerated, while it is hardly appeased by taking food. Digestion may take place easily and naturally, or it may be accompanied with acid eructations and pyrosis. The chief feature of *bulimic dyspepsia* (so termed by Dr. Guipon) is, however, that the desire for food returns almost directly after a good meal. The patients suffer from constant hunger; and unless they eat immediately the desire for food comes on, they get faint and low-spirited, and especially complain of a painful sense of sinking about the præcordia. The remedy which I have found most rapidly curative is cod-liver oil, pepsin being also given if there be any difficulty in digesting it; but Dr. Guipon states that he has succeeded best with minced raw meat. Charcoal is also useful in checking the acid eructations.

Diagnosis.—The difficulty of diagnosing correctly the various morbid affections of the stomach is by no means slight; since not only are we for the most part ignorant of any direct means for ascertaining the physical conditions of this viscus during life, but the prominent symptoms of many of its different diseases are almost identically the same. Thus the *condition of the tongue* as an aid to diagnosis and prognosis is of importance to the extent of showing the way in which the functions of the stomach and intestines, the pancreas and liver, are being performed, rather than as giving any real information as to the absence or presence of organic disease. When this organ is habitually clean and moist, neither too florid nor yet too pale, of natural size, and not so flaccid as to be indented by the teeth, under these circumstances it may safely be inferred that there is no dyspepsia. When, on the contrary, there is irritation or inflammation of the mouth or fauces, or of any portion of the gastro-intestinal tract; when the tonsils are inflamed, when the cavities of carious teeth are allowed to retain decaying food, or when digestion is imperfectly performed, then the tongue puts on an unhealthy appearance. Speaking generally, the dorsum of this organ gets furred; a condition produced by an increased formation of epithelium, the scales of which (perhaps in a state of fatty degeneration) become mixed with buccal mucus and confervæ and remnants of food. Thus matted together, a more or less dense fur is constituted, which varies in color according to the substances taken into the mouth, and which may peel off or be scraped away in dense flakes. As a rule, the appearances of the unhealthy tongue alter according to the amount of this fur, the state of the papillæ, the color, and the moisture. Thus, the whole surface may be thickly furred; or through this fur there are seen protruding elongated and florid papillæ; or there will be a thick fur at the base, with excessive redness of the tip and sides; or with more or less fur, there are cracks, perhaps little ulcerations; or the whole organ is found rather swollen, and flabby, and indented at the edges by the teeth. During fevers and inflammations generally, in cerebral and pulmonary disorders, and in fact throughout the progress of most diseases, the tongue is furred or otherwise disordered; but whether the unnatural appearances are directly due to the disease itself, or arise indirectly in consequence of the influence of this on the gastro-intestinal mucous mem-

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ut a timely retreat can save him from ruin. All this is the lobster: and when verexcited nature has had time to manage this testaceous incumbrance, the daughter ecovers, the finances are in good order, and every rural idea effectually excluded om the mind.

"In the same manner old friendships are destroyed by toasted cheese, and hard alted meat has led to suicide. Unpleasant feelings of the body produce correspondnt sensations in the mind, and a great scene of wretchedness is sketched out by a orsel of indigestible and misguided food. Of such infinite consequence to happiess is it to study the body."—A Memoir of the Reverend Sydney Smith. By Lady olland. Vol. i, p. 125. London, 1855.

brane, is a dubious point. The probability of the latter view being correct is strengthened by our knowledge that the epithelium of the stomach tube in scarlet fever is affected, just as the structure is rapidly produced and exfoliated on the tongue. So again, the thin metallic-looking fur which gives the tongue a silvery hue when arsenic has been taken for some time, only forms when this metal is producing dyspepsia.

In the second place, we find *pain and soreness at the epigastrium* not only common to most of the organic affections of the stomach—as to cancer, simple ulcer, and inflammation of the mucous membrane and deeper structures; but also to many of the merely functional derangements, being generally present in the sympathetic vomiting of phthisis and in that of several diseases of distant organs. The diagnosis may, however, be assisted by remembering that when the pain depends upon organic disease, it is generally most severe soon after taking a meal, especially if this be heavy and indigestible; while, when it is due to functional disorder only, it is often relieved by food. This last fact has been explained on the supposition that the uneasiness is mainly owing to an unhealthy condition of the gastric secretions; which of course act the less violently the more they are diluted. In ulcer of the stomach, pain is usually constantly present, being considerably aggravated by food; in cancer, it is of a dull aching character, is most acute after meals, and often continues severe while the stomach is full; while the pain of simple indigestion (the remorse of a guilty stomach, as it has been facetiously called) only requires abstinence for its complete alleviation. A caution is not altogether uncalled for to prevent any aching in the recti muscles of the abdominal wall from being mistaken for gastric pain.

Another important symptom, namely *vomiting*, will be produced by a greater number of circumstances than those which give rise to pain. For example, sickness can be caused by the ingestion of too much food, or of food of a character unsuitable for the patient, or by the simple accumulation of food in the stomach; by organic disease of any portion of the alimentary canal, particularly of the stomach, or duodenum, or cæcum; by mechanical obstruction of any part of the intestinal tract; by irritation in distant organs, as the brain, uterus, &c.; and by morbid states of the blood. When the sickness is due to organic disease, it generally coexists with pain; and it may be diminished by eating very light food, by taking but little at a time, by counter-irritation to the epigastrium, and often by bismuth, and ice, and sedatives. In the vomiting from mechanical obstruction of the alimentary canal, we learn much by noting the time of its occurrence, the nature of the vomited matters, as well as the extent and urgency of the general symptoms. Thus in stricture of the pylorus, the vomiting only takes place when the stomach is full and distended; so that the matters brought up are large in quantity, while they frequently have a yeasty appearance and consistence. When the constriction is in the small or large intestines, the contents of the bowel are returned into the stomach (by a process hereafter to be described) and then rejected. In cerebral vomiting it is rare to find pain or tenderness about the epigastrium, or nausea; while the tongue is clean, the bowels are confined, there is severe headache, and other nervous phenomena are manifested. With the sickness from hepatic derangement, or in that caused by an unhealthy state of the blood, there is usually a constant and very depressing feeling of nausea, a thickly furred tongue, with headache, but no other pain: flatulence is also often complained of, and there is commonly disordered action of the bowels.

This leads me to speak of a fourth general symptom of the functional

and organic diseases of the stomach, which is often very annoying, and not always easily relieved, viz., *flatulence*, or the undue collection of gas in the intestinal canal. It may arise from one or more of two or three causes, that is to say, from air swallowed, from gas generated by decomposition of the contents of the stomach or bowels, or possibly from gas secreted by the mucous membrane of the intestinal canal. In the first instance, the air is thrown up by eructation, and is nearly odorless and tasteless; in the second, the gases are passed upwards or downwards, are very fetid, and often accompanied by nausea, griping sensations, borborygmi, tenesmus, &c., while in the third case the gas is generally expelled *per anum*, and has the odor of healthy fæces.

The subject of hemorrhage in connection with disease of the stomach has already (p. 91) been treated of. Pyrosis or water-brash, heartburn, acidity, distaste for all kinds of food, oppression, about the epigastrium, voracious or depraved appetite, sick-headache, &c., are all symptoms of different varieties of dyspepsia, dependent upon various causes, and requiring special treatment.

Treatment.—Abernethy used to say that no person could be persuaded to pay due attention to his digestive organs until death, or the dread of death, was staring him in the face. This, no doubt, is true of some men, whose love for good cheer seems to increase with the weakness of their stomachs; and who consequently may be said to suffer from a perpetual indigestion. Nevertheless, when advice is at length sought, the invalid is importunate for speedy relief. It is therefore a happy circumstance, that of all the organs of the body the stomach is that on which we can exert the most powerful action, both indirectly and directly. Daily observation has taught us all how thoroughly digestion is improved by those means which invigorate the system generally; as by rest and early hours, relaxation from severe studies or from the harassing cares and anxieties of business, one day's holiday in every seven, change of air, sea bathing, cold or tepid sponging, horse exercise, the disuse of tobacco and of alcoholic stimulants where these have been too freely indulged in, and so on.

The *regulation of the diet* alone will often effect a cure; while in no case indeed we expect to give any relief unless we can persuade the dyspeptic to pay attention to the quantity and nature of his food. Supposing that the physician has to deal with a severe case, it is fortunate that he can give the stomach a complete rest for twelve or twenty-four hours; or even for longer time by resorting to nutrient enemata. This fast being completed, merely the plainest food should be allowed, and only small quantities ought to be taken at a meal; asses' milk, cow's milk and lime-water, gruel, sago, arrowroot, mutton or chicken broth, and beef tea or Liebig's extract of meat, will all be useful. As we find these articles can be assimilated without causing any pain or uneasiness, we may increase the diet; and white fish (especially whiting, sole, or turbot), poultry, venison, pheasant, rabbit, or mutton, can be ordered. Stale, or unfermented, or aerated* bread, may be eaten; but vegetables (with the exception of cauliflower, asparagus, and vegetable marrow), raw fruit (save grapes and oranges), cheese, every kind of beer, port wine, and undiluted spirits, should be strictly forbidden. Pastry and confectionery are seldom admissible:

* This bread, made by the process of Dr. Dauglish, is clean and pure, and produced entirely from wheaten flour of the best qualities. It is mixed by machinery, and is untouched by the hand. Being formed without ferment or leaven (carbonic acid gas is substituted for yeast), it relieves flatulence instead of promoting it; and it is more easily digested and more nourishing than common household bread, so is more economical.

"things sweet to taste, prove in digestion sour." If any stimulant be needed, a little dry sherry or pale brandy and water will prove the least injurious, and in some instances may even be beneficial. Simple aerated water—water charged with carbonic acid gas—is often very grateful to an irritable stomach; or soda water (that which really contains a few grains of soda) can be recommended. Coffee (not chicory) taken upon an empty stomach occasionally acts as a valuable stimulant; but swallowed soon after a meal it merely serves to hinder digestion, and to make a simple dinner disagree. Then the dyspeptic should be careful to masticate his food thoroughly, so that the digestive fluids may quickly liquefy and transform it. And lastly, he ought to try and encourage an indolent sense of contentment for some little time after eating, so as not to divert from the stomach the nervous force required for the due performance of its functions; since it must in the end happen that "unquiet meals make ill digestions." For this reason it is better that busy men dine towards the close of the day, when the hurry and turmoil of active life are relaxed.

After recovery from the urgent symptoms attention will still be needed to prevent any relapse. While supervising the diet scale, however, it must be remembered that too much simplicity is bad. For not only does man absolutely require a mixed food, but that which is eaten with relish is better digested than that taken with indifference or disgust. As typical of many cases met with in practice, we may imagine the following: A gentleman between thirty and fifty-five years of age, engaged for six or eight hours daily in his office or warehouse, with an irritable revengeful stomach, and no great amount of vital power, not only wishes to be well, but what is rather more unusual is willing to take the necessary steps to secure health. To enable him to accomplish his purpose, he may be recommended to adopt for several months some such diet-table as this:

7.00 A.M.—A tumblerful of equal parts of milk and soda water, or of milk and lime-water.

7.30 A.M.—To rise from bed. Use a tepid or cold sponge bath; rub the skin thoroughly with a coarse towel. Dress leisurely

8.30 A.M.—Breakfast. A large cup of weak tea with half milk, or milk and water. Sole or whiting; or the lean of an underdone mutton-chop; or a new-laid egg lightly boiled. Stale bread and a little fresh butter. Watercresses now and then, if so be that they do not cause eructations.

1.00 P.M.—Luncheon. Oysters (conditionally that they agree); or an underdone mutton-chop, or a slice out of a roast leg of mutton, when meat has not been taken for breakfast. A biscuit, or stale bread. One glass of sherry (Manzanilla or Amontillado). Or, if there be little or no appetite, a raw egg beaten up in sherry and water, and taken with a small biscuit, will be useful.

6.00 P.M.—Dinner. Cod-fish, sole, whiting, smelts, turbot, or brill. Mutton, venison, chicken, grouse, partridge, hare, pheasant, tripe boiled in milk, sweetbread, boiled leg of lamb, or roast beef. Stale bread. Cauliflower, asparagus, vegetable marrow, French beans, floury potato, or sea-kale. Half a wineglassful of cognac in a bottle of soda water. Two glasses of good dry sherry or of claret after dinner. A few grapes, an orange, a baked apple, or perhaps strawberries, may be taken, if desired. A dose of pepsin, where needed. Where there is constipation, an excellent pill for daily use can be made with four grains of pig's pepsin and half a grain or rather more of the extract of Barbadoes aloes.

9.00 P.M.—A small glass of cold brandy and water, with a biscuit; or a cup of weak tea with half milk, and a slice of bread and butter; or a teacupful of milk-arrowroot.

11.00 P.M.—Bed. To sleep on a mattress, without too much covering. A wet compress (F. 136) over the epigastrium is of assistance. The room is to be properly ventilated. A fire will be very beneficial in cold weather. It is presumed that a good night's rest has been earned by a fair amount of exercise in the open air.

The foregoing table may of course have to be modified according to the son, though generally it will be found sufficiently suggestive. The empt to give variety, however, is not to be overlooked. There is only a rtial truth in the caution of Socrates, "Beware of such food as persuades man, though he be not hungry, to eat; and those liquors that will pre-il with a man to drink them, when he is not thirsty."*

Under the head of *medicines* in the treatment of dyspepsia, several can be referred to as having serviceable properties. Perhaps the first which ght to be mentioned is pepsin, the digestive principle of the gastric ice; generally valuable when there is an imperfect performance of the nctions of the stomach, and especially where this is indicated by pain or her disturbance following the use of animal food. It should be given in ses proportioned to the necessity of the case, with the two chief meals of e day. In some instances an advantage seems to be gained by the simul-neous use of a small quantity of the dilute hydrochloric acid. Where e pepsin alone fails to relieve the annoyance of indigestion, about the one-venth of a grain of the hydrochlorate of morphia should be combined th each dose; or when great atony prevails, the one-twenty-fourth of a ain of strychnia may be employed in the same way (F. 420). There are o other agents which increase the gastric secretions, such as the nitro-drochloric acid, rhubarb, ipecacuanha, and ginger; the first being often ecially useful, when given in small doses well diluted (F. 378). If we sh to restrain undue secretion, we resort to moderate doses of the aro-tic sulphuric acid, bismuth, nitrate of silver, conium, belladonna, opium, hydrocyanic acid; if to relieve pain and vomiting we can use ice, mor-ia, and carbonic acid—by means of effervescing draughts; while if there an excessive secretion of acid we order alkalies. Supposing that an ute attack of gastrodynia is caused by the stomach being loaded with healthy acid secretions, we must endeavor to give relief by producing miting. For this purpose the free administration of warm water will nally suffice; or if it fail, a teaspoonful of mustard in a tumblerful of ter will make the stomach eject its contents. Afterwards one or two ses of a mixture containing soda, morphia, and hydrocyanic acid (F. 70) n be advantageously ordered. Alkalies are not to be persistently given, wever, because there is a greater secretion of gastric acid than is proper; ce they will only tend to keep up the mischief by stimulating the mucous mbrane of the stomach to still greater secretion, so that there will remain rplus of free acid over the amount neutralized. When there is a feeble gestion with no great gastric irritability, one or other of the vegetable mics will often prove invaluable, and recourse may be had either to gen-n, calumba, quassia, or bark. Salicin (F. 388) is especially worth trying many instances, often agreeing well where quinine cannot be tolerated. aperients are needed only those of a mild nature ought to be prescribed; ch as gray powder and the compound rhubarb pill (F. 171), taraxacum d nitric acid and senna (F. 147), ipecacuanha and rhubarb (F. 165, 179), agnesia (F. 169), or simple enemata (F. 188), &c. Finally, to make the

* Some cynic indeed has said, in opposition to this text, that one of the great rileges of the human species over other animals is the being able to eat without eling hungry, and to drink without being thirsty.

cure complete, and to prevent a relapse as far as drugs will do so, mild preparations of steel (F. 401, 403, 408) are to be ordered; while it may be noted that frequently I have found benefit from combining pepsin with the reduced iron (F. 394). Where there is any suspicion that the digestion is still torpid from want of tone, few remedies will prove of greater service than quinine and ipecacuanha (F. 384).

With regard to the use of wine and well-diluted spirits to *prevent* dyspepsia, it must be granted that they are often very beneficial; provided that they be taken in strict moderation, and only at mealtimes. It is no doubt true that the stomach which requires stimulants to enable it to act efficiently, can hardly be said to be in a healthy state. But at the same time we should remember, that the battle of life is not waged without much wear and tear, without almost overwhelming anxieties and sickening disappointments; and that the digestive organs are the first to sympathise with the depression of the mind, no less than with the fatigues of the body. Hence the precept furnished by St. Paul to Timothy may well be adopted generally,—"Drink no longer water, but use a little wine for thy stomach's sake and thine often infirmities."

VIII. GASTRITIS.

Under the head of Gastritis [Γαστήρ = the stomach; terminal -itis] several important affections of the stomach, more or less closely connected with the inflammatory process, have to be considered. The well-directed labors of many eminent physicians, both abroad and at home, during the past few years, have done much to improve our knowledge of these obscure but highly important diseases.

1. ACUTE GASTRITIS.—Acute inflammation of the mucous membrane of the stomach is a disease which in all probability never arises idiopathically. It is, however, a frequent result of poisoning by any of the irritants—as by the mineral acids, caustic alkalies, arsenic, &c.; and it sometimes occurs from swallowing boiling water, or large quantities of irritating emetics when they fail to produce vomiting, or excessive doses of tartar emetic.

Symptoms.—In gastritis produced by irritant poisoning we shall generally find an increasing burning pain in the epigastrium, aggravated by the slightest pressure; constant distressing nausea, soon followed by violent retchings; an accelerated pulse, with more or less difficulty of breathing; and great thirst, with an unremitting desire for cold drinks, which are vomited as soon as taken. Very shortly there sets in extreme prostration; denoted particularly by faintness, feebleness and great frequency of the pulse, marked pallor, cold clammy extremities, and intense anxiety of countenance. When the inflammation continues, the tongue becomes red and glazed and smooth, unless it has been injured by the action of the poison; the bowels are constipated; the urine is scanty and high-colored; there is great restlessness and hiccup; while the prostration increases, till death takes place from exhaustion. These symptoms are not present in all cases; the immediate effects of severe injury to the stomach being sometimes comparatively slight. When the Eddystone Lighthouse was destroyed by fire in 1755, one of the keepers happened to be burnt by the fall of the molten

ead. The man asserted that some of the metal had passed down his throat; ut as he had gone through much fatigue after the accident, and had begun o amend at the sixth day, his statement was not credited. However, on he eleventh day he rapidly grew worse and died; when, on examining the ody, a piece of lead weighing more than seven ounces was removed from he stomach.

Morbid Anatomy.—The morbid appearances usually found are intense lark redness, softness, sloughing, and (when one of the powerful escharotics has been taken) perforation. Redness alone is by no means evidence of the previous existence of inflammation, since it may be produced after death by gravitation of the blood to the most dependent parts: where death occurs, too, from any cause during the process of digestion, the stomach is sometimes found intensely red. So also with regard to softening and perforation, we must remember that these may occur from the post-mortem action of the gastric juice—from the stomach actually digesting its own tissues, a fact which was first pointed out by John Hunter.

Few subjects in pathology are more interesting than this one of *Cadaveric softening of the Stomach.* It is a condition not uncommonly found when death has occurred suddenly from an accident soon after a meal, and when the body has been kept in a warm situation. The most frequent site of the softening is the fundus and cardiac end of the viscus; and it is perhaps most often met with in young subjects, and after death from phthisis, or severe cerebral disease giving rise to great exhaustion. Some interesting experiments have been made by Bernard, Harley, Pavy, and others, upon this power of the gastric juice. Through a fistulous opening in the stomach of a dog, Dr. Pavy introduced, during the process of digestion, the hind leg of a living frog, and the ear of a live rabbit. In both cases the parts underwent digestion after two or three hours. Hence, Dr. Pavy argues, that the capability of resisting their own digestive powers as possessed by the walls of the stomach during life, and which ceases with death, is not due as Hunter thought, to the vital force with which they are endowed. If, then, this reputed influence of the "living principle" have no foundation, what view can be substituted? Recourse has been had to the theory that the immunity to destruction which the stomach enjoys during life is due to its epithelial lining. For, it is said, while digestion is going on, the gastric epithelium and mucus are constantly being dissolved, but then they are as constantly being reproduced. After death, the gastric juice still acts upon the epithelium, when, as no new layers are formed, the deeper coats suffer. Dr. Pavy has found, however, on submitting this view to the test of experiment that it completely fails; inasmuch as he removed a considerable-sized patch of mucous membrane, and yet food was afterwards digested without the slightest sign of any attack being made on the deeper coats of the stomach. The question therefore remains unanswered up to this point. And now, Dr. Pavy has another suggestion—*i. e.*, that the protection is to be referred to the circulation within the walls of the organ of an alkaline current of blood. His argument is that the presence of acidity is necessary for the accomplishment of gastric digestion: alkalinity is a constant character of the blood: during life the walls of the stomach are everywhere permeated by a current of this alkaline blood: hence, here we find an opposing influence, the effect of which is to destroy, by neutralizing its acidity, the solvent properties of the digestive fluid tending to act upon the texture of the organ. The blood being stagnant after death, the opposing influence is lost. Should life happen to close during digestion, there is only the neutralizing power of the blood actually in the vessels of the stomach, to impede the progress of attack upon the organ itself; and the

consequence is, that erosion of its parietes proceeds, so long as the temperature remains favorable for the process, and the solvent power of the digestive liquid is unexhausted. The apparent contradiction to this hypothesis which is offered in the fact of the living frog's legs, and the rabbit's ears, being digested, is said to be a question of degree of power between two opposing influences. The very active circulation through the stomach suffices to protect its walls; while the comparatively exsanguine ears of the rabbit and legs of the frog suffer. I confess there is but little in this ingenious explanation which recommends it to my mind. It may be true, though there is nothing convincing in the argument (see p. 570). Let us assert, for example, that the stomach is protected during life by nervous influence. May not the foregoing testimony be brought forward in support of such a view, with as much show of reason as when it is adduced in favor of the results produced by the alkalinity of the blood?

Treatment.—The treatment of acute gastritis will in a great measure be the same, whatever may be its cause. In most cases, I should rely on opium, and the sucking of ice—which will frequently relieve the vomiting, as well as lessen the inflammation. Perhaps, at the same time, it might not be injudicious to allow small quantities of barley-water, milk or cream, cold arrowroot, or gruel. As a rule, however, it will be much better to nourish the patient by nutritious enemata (F. 21, 22, 23) than by food administered through the mouth. In some instances, fomentations applied to the epigastrium give much relief; while in others, a bladder of ice has proved more soothing. When any of the corrosive poisons have been taken, emetics will very rarely be necessary, since the destructive agents themselves induce severe vomiting: the stomach-pump should never be used. During convalescence, great care will be required in regulating the diet; farinaceous substances and broths being chiefly allowed, while these ought only to be given in small quantities at a time.

2. CHRONIC GASTRITIS.—This form of inflammation is almost as common as the preceding variety is rare. It is fortunately a mild disorder, unless of long duration; when it may produce thickening and induration of the coats of the stomach, narrowing of the pylorus, or even ulceration perhaps going on to perforation.

The *causes* are numerous. There is no doubt that it may be brought on by excess in eating or drinking. Dr. Beaumont frequently witnessed this result in Alexis St. Martin; who, in consequence of a gunshot wound, had a permanent fistulous opening through the abdominal parietes into the stomach, thus affording an opportunity for watching the process of digestion. Under the continued use of improper food, the inflammation always became aggravated; whereas under the influence of low diet and cooling drinks the stomach rapidly recovered. Acute or chronic alcoholism is one of its most common sources; and so is the use of beer, especially when this is drunk at odd times during the day. On the other hand, long-continued abstinence is a cause of chronic gastritis; as has been proved in experiments upon dogs and other animals when deprived of food. So also this disease sometimes arises during the progress of acute inflammations and febrile diseases, particularly some of the exanthemata—as scarlatina; small quantities of arsenic, in whatever way they may be introduced into the system, will produce it; sometimes the poison of gout in the blood seems to give rise to it; and lastly, it may now and then be due to some narrowing of the pylorus impeding the passage of food into the intestines.

The chief *symptoms* are anorexia, tenderness at the epigastrium and sternum, pain and vomiting after meals, slowness of digestion, cramps, acid

of obstruction to the circulation impeding the return of blood from
nach towards the heart. Passive congestion of the stomach, leading
s to severe hæmatemesis, is most frequently due to some cause which
ts the free flow of blood through the liver—as "hob-nail," or gin-
r's liver. Organic affections of the heart and lungs not unfrequently
ıe stomach in a state of distressing chronic congestion.
egards the *treatment*, attention must be paid to those rules which
ɛen laid down in the remarks on Dyspepsia. In many cases removal
cause, assisted by low diet and cold water as a drink, will thoroughly
e disease in a short time.

ASTRIC CATARRH.—Catarrhal affections of the stomach, like
f other mucous membranes, present themselves under two or three
ıt forms. They are really instances of gastric irritation, the morbid
having a tendency to run into chronic inflammation if unchecked.
ın slight, these disorders are usually spoken of as "bilious attacks;"
ıptoms being little more than those of simple indigestion, such as a
tongue, oppression at the epigastrium, constipation, anorexia, vomit-
bile, giddiness, and "sick headache." If the mucous membrane
ıe seen in these cases, it would be found congested, œdematous, and
ɜ marked here and there with patches of ecchymosis. For the treat-
f these cases nothing more is necessary than a purgative pill of calo-
d rhubarb, or of aloes, at bedtime; followed by a seidlitz powder or
of soda water early on the following morning. A meagre diet and
of cold water for the succeeding twelve hours will complete the cure.
lic stimulants had better be avoided.
ınic catarrh or mucous flux may succeed a bilious attack, or it will
ually arise as a separate affection. As causes must be mentioned,
er food,—pork, goose, duck, salmon, mushrooms, cucumber, iced
; the abuse of wine and spirits and beer, including their moderate
ment in some conditions and constitutions; an unhealthy state of
, as the presence of one of the eruptive fevers, cholera, diphtheria,
ı, gout, &c.; and the employment of particular medicines, espe-
ɔpaiba, cubebs, turpentine, &c. Gastric catarrh often coexists with

iting of glairy fluid on awaking in the morning, weakness, coldness of the extremities, &c., are often connected with gastric flux. The most useful remedies for restoring the stomach to its natural condition are those which restrain the secretion of mucus; such as the sulphite of soda (F. 48), bismuth (F. 65, 112), perhaps the oxide or nitrate of silver (F. 47, 59), oxalate of cerium (two or three grains in a pill with henbane or gentian every six or eight hours), kino and logwood (F. 108), the officinal infusion of matico, and occasionally the iron alum (F. 116). If there be much constipation I think a dose of five grains of calomel is one of the best purgatives; the action of the bowels being subsequently kept regular by small doses of aloes at dinner, or by effervescing citrate of magnesia before breakfast, or by Pullna water, or compound rhubarb powder. Of course attention must be paid to the diet; and it will usually be better for two or three days to keep the patient almost entirely upon milk rendered alkaline by admixture with lime-water, allowing small quantities at short intervals. Then arrowroot made with milk, bread and milk, and one or two eggs lightly poached, with stale bread and fresh butter, may be permitted; followed after a short time by white fish, poultry, mutton, sherry and water, &c.

The more severe examples of gastric catarrh produce symptoms which are often regarded as inflammatory; and hence they are often spoken of as "gastric fevers." In these cases the skin is hot and dry, the pulse is quick and full, there is vomiting with epigastric pain, and scanty urine, which is loaded with lithates. Superficial ulceration sometimes results, especially when the catarrh is due to long-continued congestive disease of the portal system. The chief remedies are rest, low diet, sucking ice, demulcent drinks, aloetic or rhubarb aperients, and effervescing salines. At the commencement, if there be a sense of nausea without vomiting, an emetic of ipecacuanha will give relief. The epigastric tenderness may be best relieved by hot fomentations, or poultices, or even turpentine stupes; with small doses, often repeated, of laurel-water, diluted hydrocyanic acid, subnitrate of bismuth, or the solution of citrate of bismuth and ammonia.

4. INDURATION OF THE PYLORUS.—Induration or fibroid infiltration of the pylorus appears to consist of an abnormal development of fibrous tissue in the submucous areolar membrane about the pyloric portion of the stomach. This condition may come about as the result of chronic inflammation; or perhaps it will arise from the healing and contraction of an ulcer, or from repeated irritation caused by the habitual use of raw spirits. The appearance of the diseased structure to the naked eye somewhat resembles scirrhus, so that by some pathologists this disease has been erroneously regarded as malignant; but minutely examined it is found to be composed of tissues resembling those of a simple fibroid tumor, and not to consist of the copious cell-growth characteristic of cancer. The walls of the pylorus are at times only slightly thickened; or they may be converted into fibro-cartilaginous tissue, with such contraction of the opening that ultimately nothing larger than a crowquill can pass. In proportion to the amount of obstruction, there will be found dilatation of the stomach; together with hypertrophy of its muscular coat.

Although the pyloric region is by far the most frequent seat of the fibrous deposit or infiltration, yet the cardiac orifice may also suffer, or even the whole of the viscus can be affected. In the latter case, the necropsy shows a large stomach of an opaque pearly-white appearance, of increased weight and density, of a gristly feel, and having its coats greatly thickened. This condition now and then exists without giving rise to any symptoms of in-

ıce three or four hours after a meal—especially after dinner; the brought up being partly digested, mixed with water, often yeasty- and perhaps containing sarcinæ or torulæ. Ordinarily, except the last, the sickness only occurs at intervals of a few days; while ɔe much hypertrophy the contents of the stomach are ejected with ıble force. As the patient gradually wastes, so the thickened issues can be felt (like a tumor, perhaps the size of a small orange) the abdominal parietes; the swelling only being really painful ɔre is any ulceration. By its pressure on the aorta it usually gives oublesome pulsations. After a time the feet and legs get œdema- mind is active but dispirited, there is epigastric soreness, the sleep ɔed, diarrhœa often intervenes, and death ultimately occurs from . In many instances, however, by strict attention to the diet, life ɔrolonged for several years.

eatment ought to consist in allowing only simple soft food, such as ɜam, raw eggs beaten up in sherry and water, strong beef tea, and d-liver oil often proves useful during the early stage. At the same l and quinine are of service. When there is any temporary exacer- the symptoms, the stomach should be rested for a day or two, and enemata resorted to. The patient had better be warmly clothed; ɔ abdominal belt gives agreeable support; while the gastric irrita- ɑ often be relieved by a belladonna plaster.

LATATION OF THE STOMACH.—Dilatation of the stomach is ı disease, to which attention has lately been directed. The enlarge- ısually the irremovable issue of some affection of the pyloric orifice, ıusing contraction, prevents the food from readily passing into the ın. Hence, the stomach slowly and gradually dilates, until at last to occupy the greater portion of the abdominal cavity, giving rise rances as if a large tumor were present. These phenomena are deceitful when the stomach is full, because fluctuation may then ıt; when this viscus is empty there will be a widespread tympanitic percussion.

ıtient suffers severely from gastralgia, gastrodynia, pyrosis, flatus,

seen to contain large quantities of those vegetable parasites first described by Goodsir, the *Sarcinæ ventriculi*, together generally with the yeast fungus, *Torulæ cerevisiæ*. Dr. Todd discovered the sarcinæ in ulceration of the stomach with contraction of the pylorus, and he suggested that these vegetable organisms were the result of the long detention of food in the stomach. There is but little room for doubting this explanation is correct. At the same time it is also probable, that the intensely acid fluid in which the sarcinæ are found may itself irritate and close the pylorus spasmodically. In such cases, consequently, if we check the formation of these growths we shall greatly relieve the disease. Thanks to Sir William Jenner and Professor Graham, we are enabled readily to accomplish this object by the administration of the sulphite of potash, or by the sulphite of soda; which latter (F. 48) is perhaps preferable, since it is a more stable salt, and is less liable to be decomposed by keeping than the sulphite of potash. The beneficial action of either of these salts depends upon their being decomposed in the stomach by the acids generated therein; sulphurous acid gas being liberated, which quite destroys the fungi. Dr. T. K. Chambers prefers the hyposulphite of soda, in doses of gr. 5 to 20, thrice daily. The patient's diet should be regulated, and it will be better for him to be allowed the unfermented in the place of the common household bread.

IX. ULCER OF THE STOMACH.

This is a particularly interesting and not uncommon disease. It is variously spoken of by authors as the *simple*, *chronic*, *round*, or *perforating* ulcer of the stomach. The features chiefly presented by it are debility, pain, indigestion, sickness, and hæmatemesis. The ulcer will perhaps cicatrize, and complete recovery ensue. On the contrary, the loss of substance may gradually increase. Life is then terminated by marasmus from want of nourishment, or in a few hours by perforation and consequent acute peritonitis, or by abundant hemorrhage.

Causes.—The cause of ulcer of the stomach has not as yet been determined. This affection is most frequent in women, while there appears to be some uncertain relation between gastric ulcer and disturbed menstruation—particularly amenorrhœa. Out of 39 histories of cases terminating by perforation, collected by Dr. Edwards Crisp, the state of the uterine functions is only mentioned in 14; in 13 of these the catamenia either having never appeared, or being irregular, or being suppressed.

According to Virchow, the first step in the production of the ulceration is the arrest of the circulation through a sufficient depth of the gastric tissues to permit of the destructive power of the acid gastric juice being exerted without the check it naturally receives from the alkaline blood. The circulation is supposed to be arrested from arterial obstruction by embolism, from extravasations owing to obstructions of the portal vein, or to mechanical violence in retching, or to diminished calibre of the vessels, the consequence of some morbid condition of their coats. Were this explanation correct, it might fairly be inferred that gastric ulcer would most frequently be found complicating those diseases in which the alkalinity of the blood is reduced. Yet in chronic gout, for example, where this condition obtains in combination probably with a maximum degree of gastric acidity, ulcer of the stomach is not met with. So again, in cholera, we have

lity for the different statements must not be shifted from my

Among the 4000 cases of different diseases which formerly er Dr. Brinton's care annually at the Royal Free Hospital, he l that there were at least 40 examples of ulcer of the stomach. rvation agrees in the main with that of foreign pathologists. It e that in the post-mortem room a cicatrix or an unhealed ulcer und in from 3.5 to 4 per cent. of the total cases examined.

er is more frequent in the female than the male in the proportion two to one. It is specially a disease of middle and advancing y ever occurring before puberty; while it is more frequent in the in the rich, and perhaps amongst needlewomen and domestic ser- ı other females. The ulcer is rarely smaller than a fourpenny arger than a crown piece; its shape is usually circular or slightly the edges are at times sharp, as if the tissue had been punched ther instances irregular and infiltrated with black blood. It is e frequently found on the posterior surface, the lesser curvature, or e pouch, than on the anterior surface, the greater curvature, or the ıtremity; while two or more ulcers are frequently present in the ıach. About two-thirds of the instances of this disease undergo obably a spontaneous cure; in exceptional cases the ulcer has in ten days, generally by perforation; sometimes by exhaustion hastened by vomiting, and very rarely by hemorrhage. As re- majority of fatal instances, a period of several weeks or months death. Perforation, however, is an exceptional occurrence in er; where it occurs, the ulcer has commonly been found on the urface of the stomach. When perforation does take place, the f the stomach are generally poured into the abdominal cavity, y give rise to fatal peritonitis. But in some very few instances n—owing to the presence of adhesions, &c.—is confined to the ood of the perforated spot, so that circumscribed peritonitis is set ration takes place, and a kind of chronic abscess is formed. This e fatal in many ways, as, *e.g.*, by discharging its contents through ragm into the thorax; or, more fortunately, it will possibly open through the abdominal walls. In the latter case a gastric fistula

Symptoms.—The symptoms are liable to some variety, and hence the discrepancies which are to be found in the descriptions of different observers. The most constant indication is a wearying burning pain in the back over the lower dorsal vertebræ and in the epigastrium. With respect to the latter situation, the aching or uneasiness is often referred to a small spot just below the ensiform cartilage; while it is frequently described as dull and sickening, and almost always as being increased by food. Sometimes the pain is associated with violent pulsations, with attacks of syncope, or with convulsions, and in some few young women it has apparently been increased by the access of menstruation. There is occasionally eructation of a sour fluid, and at times nausea with vomiting. The food is rejected unaltered or converted into chyme according to the time it has been retained. The appetite does not usually fail; but the patient feels it can only be gratified at a heavy penalty. The bowels get inactive. The patient generally loses flesh as well as strength, but otherwise the constitutional symptoms are slight, with this exception, that in young females amenorrhœa is often produced, especially in those cases where there is copious hemorrhage from the ulcer. After the disease has continued a longer or a shorter period the patient may sink from exhaustion, or perforation will perhaps occur; or failing this, there may be a severe attack of hemorrhage. But in favorable cases the ulcer gradually heals, the pains and sickness and attacks of hæmatemesis diminish, and the patient completely recovers, save in a few exceptional instances where the cicatrization produces contraction of the pylorus, &c.

Supposing perforation to result, with effusion of the contents of the stomach into the peritoneum, the symptoms will be so severe that the nature of the case cannot be mistaken. There is violent pain, beginning in the epigastrium, but soon spreading over the whole belly; the abdomen becomes swollen and tympanitic; the patient assumes that position which most relaxes the abdominal muscles; there will probably be complete suppression of urine, and there is great anxiety, with rapidly increasing prostration. Moreover, these indications of the giving way of the coats of the stomach usually occur after a full meal, and perhaps from some sudden exertion, as that produced by vomitting, coughing, sneezing, &c. After an interval, a state of almost painless collapse sets in, and death usually occurs within thirty-six hours from the time of rupture. I have, however, known of immediate dissolution from shock.

Treatment.—In the management of cases of ulcer of the stomach we have chiefly to rest the diseased viscus, to support the system, and to facilitate the cicatrization of the ulcer. When the pain is very severe, hot fomentations, sinapisms, and turpentine stupes applied over the epigastrium give relief; in obstinate vomiting, or in hemorrhage, the application of cold (ice and salt in a bladder) is more advisable. Opium can often be administered with very great advantage, either alone in the form of the extract, or combined with henbane, Indian hemp, &c. Bismuth is also a good sedative, and may be given in ten-grain doses, thrice daily, mixed with five or ten grains of compound kino powder. Where there is much flatulent nausea, Dr. Brinton recommended the iodide of potassium in small doses, with the bicarbonate of potash and some bitter infusion. Supposing the vomiting to be very troublesome, I have seen most relief from five minims of the officinal laurel-water in half an ounce of iced water; repeating the dose every two or three hours. Effervescing draughts, champagne, soda-water, &c., will often check the sickness temporarily, but usually at the expense of aggravating the pain. Where there is but little pain or nausea some mild preparation of steel (F. 398, 401, 403) will prove

valuable; or, if the patient can bear it, quinine and iron (F. 380) be ordered. Supposing that aperients are needed during the progress e case, small doses of castor oil will be most efficacious, provided that le enemata are inapplicable.

ıy of the foregoing remedies, however, will be almost worse than useless s great attention is paid to the nature of the food and the quantity ı at each meal. At the commencement it will be better merely to r farinaceous substances—as a little oatmeal or arrowroot—with milk; ıg care that only a very small quantity be used at a time. Cold milk, ıd with one-fourth part of lime-water to prevent its coagulating in the ach, can be taken in small quantities at a time to the extent of three ıur pints in the twenty-four hours. It is probable that milk thus ered alkaline is digested in the intestines; so that its administration y rests the stomach. Should even this food be rejected by the stomach, viscus ought to be allowed a complete rest; nourishment and medicine ; administered entirely by enemata (F. 21, 22, 23, 188). Then, as the ıtoms decrease, a more strengthening diet will advantageously but ously be permitted; until the patient can painlessly digest and enjoy ; fish, light puddings, poultry, &c. During the whole progress of the tea and coffee, uncooked fruit and sugar, vegetables and pastry, beer other alcoholic stimulants, should be forbidden; but if the latter be d for by the wants of the system, only a little weak brandy and water t to be ordered.

ith regard to the management of threatened or accomplished perfora- all that can be done is to administer full doses of opium for several ; to keep the stomach empty; and to place the patient in such a posi- that the ulcer may be uppermost, and not where fluids can gravitate

And lastly, under all circumstances, after a cure has been effected ıatient must be warned that a careful avoidance of errors in diet, of ure over the epigastrium, as well as of violent exercise, will be neces- for many months. A single excess, several weeks subsequent to re- y, has brought back all the painful symptoms, and again placed the er's life in considerable jeopardy.

X. CANCER OF THE STOMACH.

ıe stomach may suffer from scirrhous, medullary, or colloid cancer; the affection is generally *primary*. The disease often comes on gradu- the early indications of it being obscure.

thology.—A record of 9118 cases of death from cancer, in Paris, from to 1840, shows that the disease was seated in the uterus in 2906 cases, e stomach in 2303, and in the breast in 1149. The pyloric aperture e part most frequently attacked, next the cardiac orifice, and then the along the smaller curvature. "Sometimes the cancer, at the time of ı, is of small extent; but occasionally, and especially in colloid cancer, disease spreads, until the greater portion, or even the whole of the ach, is involved."* When the disease causes obstruction or narrowing ıe pyloric orifice, the stomach generally becomes greatly dilated. ric cancer is possibly slightly more common in men than in women.

* On Diseases of the Stomach, p. 161. By Dr. George Budd. London, 1855.

It is rare before the age of forty; taking the number of persons living into account, the liability seems greatest between 60 and 70. Very few cases survive two years from the first appearance of the symptoms; in scirrhus—the most common variety of gastric cancer—life will rarely be prolonged for three years; while in encephaloid and colloid, death often takes place within twelve months.

Symptoms.—During the early stage there are simply indications of dyspepsia. After a time more marked symptoms set in, which vary in character according to the situation of the disease. When it is in or near the cardiac orifice, there will be merely considerable pain and some difficulty on passing food into the stomach; if in the pylorus, pain and sickness, when a few hours after eating (digestion being completed) the chyme has to pass into the duodenum; while, where the lesser curvature is the seat of the affection, the suffering may often be very slight until near the termination of the case.

Speaking generally, the principal symptoms may be described thus: Pain in the epigastrium, of a burning, lancinating, or gnawing character, augmented after eating, and often increased by pressure; retraction of the abdominal wall; eructations of fetid air: frequent nausea and vomiting, the matters ejected consisting at first of ingesta and glairy mucus, subsequently of a bloody sanious fluid, and sometimes of dark grumous matter having a coffee-grounds appearance; constipation; together with an extreme and increasing emaciation and debility. Occasionally a pulsating tumor is felt in the epigastrium when the cancerous mass lies over the aorta; or merely a tumor may be detected in some part of the epigastric, umbilical, or hypochondriac regions, so placed as not to receive any impulse from the bloodvessel. And then, in almost all cases, the countenance will present the peculiar cachectic hue and expression so characteristic of the cancerous diathesis.

Treatment.—As in all other malignant diseases, our remedies for cancer of the stomach can only be palliative; for the disease makes continual progress, and rapidly exhausts the powers of life. Opium, administered either by the mouth, or rectum, or subcutaneously, will be necessary; and it should be given in free and repeated doses to subdue the pain. When the vomiting is very severe, nourishment must be given by means of enemata: where it can be borne, however, a milk diet, with two or three raw eggs in the twenty-four hours, will be serviceable. In some instances, perhaps, it may be advantageous to lessen the work of the stomach by the administration of pepsin; but this remedy could only be of any real service at an early stage of the complaint. Cod-liver oil is occasionally easily digested. If the eructations are very fetid, a little freshly-prepared wood charcoal will do good, or that made from vegetable ivory as suggested by Dr. Leared can be recommended, or charcoal biscuits may be had recourse to. The extract of belladonna, or a piece of lint, soaked in hot tincture of opium, applied to the epigastric region, will often prove grateful to the patient's feelings; or the subcutaneous injection of morphia can be tried; or a small blister may even be raised, and its raw surface afterwards dusted with from one-third of a grain to two grains of morphia, according to the patient's susceptibility to the influence of this drug.

PERFORATION OF THE STOMACH.—In malignant as well as in simple ulceration of the stomach, perforation will from time to time take place, with escape of the contents of this viscus—fortunately not always into the peritoneum. Communications are in this way occasionally formed through the parietes, between the stomach and the outside of the abdomen; or

opening measured four inches transversely, and three from above
ls; while directly a plug which she wore was removed, the con-
ıe stomach escaped. The health was delicate but improving.
colic fistulæ are much more common than *gastro-duodenal;* while
generally for their cause malignant rather than simple ulcera-
gastro-colic fistula, moreover, the stomach and colon are not
ınd closely adherent; but a cavity may intervene, as if a mass of
or tuberculous matter had connected the two, and had been grad-
owed out. The symptoms produced by such a fistula are chiefly
iting, and the expulsion of undigested food with the stools;
the one case, to the retrocession of the contents of the colon into
:h, and in the other to the passage of the gastric matters directly
ırge intestine. When these effects follow upon the symptoms of
; or simple gastric ulcer, the diagnosis cannot be a matter of much

ng the contents of the stomach to be expelled into the cavity of
neum, intense pain and collapse and severe inflammation neces-
in immediately. Death generally occurs within thirty-six hours,
may be postponed for a few days. If any drug will save the
ife it is opium in full doses, repeated at proper intervals.

XI. DISEASES OF THE DUODENUM.

all intestine, consisting of the duodenum, jejunum, and ileum, is
ted tube, some twenty feet in length. The duodenum [*Duodeni* =
ecause this portion of the bowel was said by the ancients to be
ength to the breadth of twelve fingers] extends from the pyloric
:he stomach to the jejunum, is some ten inches long, has no mesen-
perfectly covered with peritoneum, and is more fixed than any
tion of the small intestines. In it, the chyme having passed

holic liquids; in which cases also there is well-marked tenderness about the right hypochondrium, partly owing to the inflamed condition of the duodenum, and partly perhaps to sympathetic irritation of the liver.

Perforating ulcer of the duodenum presents many of the symptoms of an ulcer in the stomach, but in a mitigated form. Consequently fatal perforation occasionally takes place suddenly, when the patient has previously made but little complaint. A curious observation has been made by Cunia, Dupuytren, Long, Curling, and Erichsen, to the effect that a sloughing ulcer sometimes forms in the upper part of the duodenum within a few days after a severe burn, and doubtless in consequence of it; an observation which is probably correct, and which I think one or two pathologists have already supported by the recital of cases where such ulceration existed. Still it will be satisfactory for this point to be further investigated, so as finally to refute or confirm the statement; inasmuch as Dr. Wilks, in many autopsies after death from burns, has found the duodenum free from all disease. When an ulcer exists, it is capable of producing diarrhœa with bloody stools, nausea and vomiting, severe pain three or four hours after a meal, and great prostration; while it may destroy life by hemorrhage, or by peritonitis consecutive to perforation.

Supposing perforation to occur acute peritonitis is set up very rapidly, the suffering becoming most acute. In addition to great anxiety and general distress, there will be hurried breathing, urgent thirst, incessant vomiting of a greenish bilious-looking fluid, and pain, which is rendered most agonizing by pressure. In many instances there has been complete suppression of urine. So great is the suffering, that ofttimes no justifiable dose of opium relieves it; and the practitioner is bound for very pity's sake to have recourse to the prolonged administration of chloroform by inhalation.

Primary cancer of the duodenum is a very rare affection. But this portion of the bowel not unfrequently becomes secondarily involved in the course of hepatic cancer, as well as in malignant disease of the pancreas or neighboring lymphatic glands. In cancer about the pylorus, the disease does not spread into the duodenum as frequently as might be expected.

Obstruction of the bowels is seldom due to a mechanical impediment seated in the duodenum. I have seen an instance, however, where a very large biliary calculus had ulcerated through the coats of the gall-bladder, and where it was found, after death, as firmly impacted in the duodenum as a cork wedged into the mouth of a bottle. The history and symptoms pointed strongly to obstruction by a biliary concretion, and to such obstruction being situated high up in the bowel, but the site could not be more accurately defined. For although the secretion of urine was very scanty, the vomiting an early symptom, and the matters ejected bilious but free from stercoraceous odor, yet the same occurrences take place in occlusion of the jejunum.

A small nematode helminth—the *Sclerostoma Duodenale* or *Anchylostoma Duodenale*—is occasionally seen in the human duodenum and jejunum. The female worms are more numerous than the males, and are rather larger; the latter measuring about one-third of an inch in length. There are four oral papillæ, by which it attaches itself very firmly to the mucous membrane of the bowel. This entozoon is found in the inhabitants of Northern Italy, but especially in those of Egypt. The chief symptoms produced by it are stools containing small quantities of blood, slowly pro-

XII. ENTERITIS.

is [from Ἔντερον = an intestine + the terminal *-itis*], or inflam-
the small intestines, varies much in severity; being sometimes so
ıardly to attract notice, and now and then so severe as to threaten
ıpidly destroy life.
estine is very seldom affected throughout its whole extent; but I
ıo marked signs by which we can localize the morbid action so as
hat it is only in the duodenum, or in the jejunum, or in the ileum.
, the inflammation may affect all the coats of the intestine or only
ıs lining; the latter being a not uncommon disease of childhood,
ly during the progress of dentition.
gy.—Idiopathic enteritis is rare, the inflammation being generally
ne constitutional cause. Hence we may have a tubercular form,
variety, &c. When inflamed the intestinal mucous membrane
ınd of a deep venous red color, exceedingly congested, and covered
ccess of mucus. If the morbid action be confined to the duodenum
on is known as *duodenitis*. Sometimes numerous ulcers are found
through the whole of the small intestines, especially when there
long-protracted diarrhœa. In typhoid fever the solitary glands
r's patches in the lower part of the ileum, and sometimes in the
well as the ascending colon, are chiefly affected; the ulceration
lly progressing to such an extent as to cause perforation.
ened state of the coats of the intestines frequently results from
ion of a chronic or subacute kind. An irritable mucous mem-
ompanies this condition; whilst the peristaltic movements are
ıy the deposit of exudatory matter in the intestinal walls. Hence
that the characteristic symptoms consists of attacks of diarrhœa,
f mild dysentery, alternating with constipation and retention of
together with slight tenderness on pressure, and a feeling of re-
ın practicing palpation over the affected parts. Friction with
tment, a nourishing but unstimulating diet, and regulation of the

nausea and vomiting; while he lies on his back with his knees drawn up so as to relax the parietes of the abdomen. Very quickly these symptoms are followed by great restlessness, high fever, prostration of strength, anxiety of countenance, obstinate costiveness, and in severe cases by delirium. As regards the pain, it must be remembered that it is increased by the slightest pressure; while in colic, on the contrary, pressure gives relief. The matters vomited are usually highly offensive, and are sometimes stercoraceous. The pulse is at first full and hard, but it soon becomes wiry and almost imperceptible.

Muco-enteritis, or inflammation of the lining membrane of the intestine, now and then occurs in young children from six to eight months old. The infant gets hot and restlesss in the early stages, and suffers from thirst; the tongue becomes dry or covered with a brownish crust; there is frequent screaming, and disturbed sleep; the abdomen becomes distended from flatus, while there is pain, which is increased on pressure; and there is irregular action of the bowels—in most cases diarrhœa, the fæces being green and offensive, and often discharged with considerable force. Towards night there is usually an exacerbation of the febrile symptoms. Thus far the disease does not differ much from a sharp attack of diarrhœa. Severe constitutional symptoms, however, soon set in; such as great febrile oppression, thirst, vomiting, dryness of the tongue, watery diarrhœa, &c.; followed by rapid and unexpected exhaustion, or sometimes by coma with a peculiar pale and waxen appearance of the body. These symptoms may come on before the disease has lasted any considerable time, and whilst it can scarcely be distinguished from the ordinary bowel complaints of children. It should be remarked that an erythematous redness is generally observed around the anus.

Diagnosis.—Enteritis has been more than once mistaken for hernia, or for obstruction of the bowels from some internal cause. A careful examination of those regions at which intestinal protrusion may take place, should be made; while the general history of the case must be well considered. In mechanical obstruction the symptoms come on slowly and steadily, the sickness is urgent, the pain is fixed, and there have often been previous attacks of constipation; in addition, with intussusception there is sudden pain like that of colic, with the discharge of a bloody mucus.

Enteritis from chronic poisoning is not to be easily distinguished from inflammation due to natural disease. But in the former the vomiting is most urgent, the stomach rejects everything, there is diarrhœa after taking food, and the pain is less severe. Where there is the least doubt, however, all the excreta should be analyzed; while until the uncertainty is removed, care must be taken that the food and medicines cannot be tampered with.

Hysterical tympanites, peritonitis, cerebral disease, and suppression of urine (either of which may induce sickness and constipation) have been mistaken for enteritis, though it seems difficult to imagine how such an error could be committed.

Treatment.—Opium freely administered is invaluable; while hot fomentations sedulously applied to the abdomen will also give great relief. Perfect quiet in bed must be enjoined. All purgatives are to be rigidly avoided; though attempts ought to be made to empty the lower parts of the intestinal canal with simple enemata, especially by warm water thrown up in large quantity, gradually and slowly, by means of a long flexible tube (such as that of the stomach-pump). After the inflammation has ceased, mild aperients, particularly castor oil, may be prescribed, followed by vegetable tonics, such as the infusion of cascarilla or the tincture of

In strumous subjects cod-liver oil, or glycerin and steel wine, do ervice. The diet should be very simple; it ought to consist chiefly ıulcent drinks, mutton and chicken broth or beef tea, and farinaceous with milk. Ice or cold water can be freely allowed with the best quences. Where there is a disposition to collapse, stimulants must be d to.

children the same kind of treatment ought to be pursued, though must be given to them with very great caution. The warm bath, ed by fomentations or linseed poultices to the abdomen, will give

Chlorate of potash in weak tea or sugared water is often efficacous; n astringent be needed, the tincture of kino and decoction of logwood est answer our purpose. When the child is at the breast no other hould be allowed; otherwise the diet must be very mild, consisting of milk with a little broth, and nicely flavored mucilaginous drinks. milk is often more easily digested than cow's or ass's milk; especially animal be kept clean, and fed upon hay and clover. Moreover, ever milk be ordered, it ought to be tested with litmus-paper; so that e found to have lost its alkaline property, the acidity may be neutral- y the addition of three or four grains of carbonate of soda to the half- r with a few drops of the saccharated solution of lime. Where there ch exhaustion, from ten to thirty minims of brandy in thin milk root, or in cold sugared water, may be given at short intervals; while mes, when the case has seemed almost hopeless, I have been much ed at finding recovery follow upon the use of a solution of raw meat . The mercury and chalk powder is often given to children directly lammatory disorder is diagnosed. I have seen it administered in enteritis, and invariably it has aggravated the symptoms.

XIII. INFLAMMATION OF THE CÆCUM.

cæcum or its appendix (situated in the right iliac fossa, and covered nteriorly and laterally by the peritoneum) is now and then found sly diseased, without any other part of the intestines being involved. severe colic and even fatal ileus may arise from the lodgment in ortion of the alimentary canal of hard fecal matter, skins or stones it, portions of unripe apples or plums, biliary and intestinal concre- balls of lumbrici and oxyurides, &c. Sometimes the intestinal mat- ccumulate to such an extent as to produce a large tumor; and many he cases where patients have recovered upon passing an immense ity of fæces, after a careless examination has led the practitioner to ose ovarian disease, or abscess, or cancer of the right kidney. When f the foreign matters get impacted in the vermiform appendix, or the n, dangerous inflammation, ending in abscess, is very likely to arise: , as we shall presently see, the persistence of disease in the appendix ccasionally form the starting-point of the morbid action in the cæcum

e inflammatory process may affect only the vascular mucous surface, the coats of the cæcum; in either case, the affection being termed [*Cæcus* = blind + the terminal *-itis*], or *typhlitis* [*Τυφλὸς* = blind terminal *-itis*]. So we can merely have *inflammation of the appen- ci*, which is attended with more acute symptoms than simple typh-

litis. Or the abundant connective tissue which attaches the cæcum to the psoas and iliac muscles will be especially involved; and then *perityphlitis* [*Περὶ* = around + *τυφλὸς*; terminal *-itis*] is the rather pedantic name applied to the disorder.

Whether it be true or not that an important part of the process of digestion is carried on in the cæcum, it cannot be denied that irritation and perhaps the suspension of the functions of this part by disease soon gives rise to prominent and distressing *symptoms*. Thus there is always more or less general constitutional disturbance, slight fever, sleeplessness, anorexia, most troublesome nausea with retching, and either diarrhœa or looseness alternating with constipation; together with fulness and tenderness about the right iliac region, the pain being rendered exquisite by pressure upon the cæcum or the parts in its immediate vicinity. The patient lies on the back or on the right side; with the trunk somewhat bent and the knees drawn up, so as to relax the tissues about the seat of inflammation. The pulse is not quickened to the same extent, nor is the countenance as anxious, as in peritonitis or enteritis. Supposing the disease to progress, the peritoneal surface of the cæcum becomes involved, the appendix gets inflamed, and we are very likely to have evidence of the existence of general peritonitis; while the surrounding connective tissue also becomes affected, and suppuration and abscess result. The latter may open externally, or into the intestinal canal, or into the vagina; the patient recovering at least temporarily. Unfortunately, the abscess often slowly fills again; and this happening time after time, and the pus burrowing in various directions, the most serious complications arise. Where, in the first instance, the purulent matter is discharged into the cavity of the peritoneum, this untoward accident is followed by great suffering, and in a few hours by death.

When the inflammation begins in the appendix from constitutional causes, or owing to the escape into this part of morbid materials or foreign bodies, the symptoms are usually very acute from the commencement; consisting especially of excruciating tormina, tympanites, hiccup, violent sickness, pain in the right ovary or testicle and thigh, and obstruction of the bowels. Gangrene of the affected part, with general peritonitis, frequently ensues and proves fatal. Or, a portion of the large intestine and cæcum with the vermiform appendix may slough off, and be passed away in a stool; restoration to health, perhaps, following at the end of a few weeks. In tuberculous typhlitis, ulceration occurs more frequently in the appendix than in the cæcum itself.

The early symptoms of perityphlitis are severe pains shooting from the right iliac region, diarrhœa and tenesmus, sickness, mental depression, great restlessness, fever, &c. The parts around the seat of inflammation become swollen, and unless resolution take place suppuration occurs. Frequently, the abscess opens into the cavity of the cæcum, and then with care the patient recovers.

Occasionally the physician meets with tedious cases of chronic inflammation of the cæcum. The symptoms come on very slowly and insidiously. There are paroxysmal attacks of pain, indications of failing health, weakness and loss of flesh, colicky pains in the right iliac region, and flatulence and anorexia. Diarrhœa alternates with constipation. Frequently the mucous coat of the bowel ulcerates, and then numerous mucous discharges, with attacks of hemorrhage, ensue; the loss of blood at times being considerable. Where there is much thickening and tumefaction of the walls of the cæcum, the case might be mistaken for an aneurism of the iliac artery. If death occur, it is generally from exhaustion; while at the

necropsy the intestinal coats are found considerably hypertrophied, inflamed and ulcerated. Very rarely is there perforation.

The *treatment* of all affections of the cæcum requires considerable caution. I have had to watch a few cases where no little mischief has arisen from the abuse of purgatives; and in one particular instance had it been necessary for me to state the cause of death, I could hardly have conscientiously given any other certificate than "Compound colocynth pills." Generally speaking, anodyne fomentations or poultices will have to be assiduously applied, while opium ought to be given internally. This latter remedy must be used in doses sufficient to keep the patient free from pain; and its influence should be maintained for several days. Prolonged hot hip-baths often give great relief. Effervescing drinks, soda-water or lemonade, bismuth, diluted hydrocyanic acid or laurel-water, and ice, will be useful in relieving the nausea; while if it appear necessary to interfere so as to obtain an action from the bowels, castor-oil enemata may be employed. Great care must be taken to keep the patient quiet in bed, as well as to enforce the use of only liquid nourishment, until all symptoms of disease have completely passed away. When there are rigors and other indications of suppuration having occurred, milk or cream, raw eggs, essence of beef, and bark with brandy or port wine will be needed. If the abscess point externally, it should be cautiously opened. Subsequently, comfort will often be derived and the abscess prevented from refilling by the guarded employment of regulated pressure. A shield of gutta percha moulded to the part, padded with wool and then lined with chamois leather, and kept in place by an ordinary truss spring, will prove an efficient instrument.

In chronic cases I have seen most good from simple nourishing food, warm bathing, sedative applications (F. 265, 281) used night and morning, and the administration of cod-liver oil; together with the employment of small doses of the mineral acids with quinine (F. 379), or of iodide of ammonium and bark (F. 38).

XIV. DYSENTERY.

Dysentery [from $\Delta\upsilon\varsigma$ = difficulty or badness + $\check{\epsilon}\nu\tau\epsilon\rho\upsilon\nu$ = intestine] consists of a specific inflammation and ulceration of the mucous membrane (occasionally also of the other tissues) of the colon, especially perhaps of the lower part of this gut and the rectum. The morbid action is attended with considerable febrile disturbance, frequent mucous and bloody stools, tenesmus, and griping pains. There is a tendency to great prostration. The disease has been sometimes termed *colitis*. Cases, however, are occasionally seen in which the ulceration does not stop at the ileo-cæcal valve, but extends for many inches up the small intestines.

Causes, &c.—Severe dysentery is now a comparatively rare disorder, in this country, either as an idiopathic affection, or as a complication of some other disease. It appears, however, occasionally to prevail as an epidemic in our prisons, or in unhealthy localities; for during the last ten years (1857–66) the deaths registered from it in England have annually ranged between 1000 and 1698. In tropical regions it is at times very prevalent, and is often particularly fatal to our soldiers and sailors. Miss Nightingale has remarked that the percentage of mortality in acute and chronic dysentery was perhaps greater in the Crimea (1854–55), owing to bad food, than

has ever been known in any disease except the worst form of epidemic plague.

Dysentery has been ascribed to the action of wet and cold and damp night air, to contagion, to malaria, to drinking polluted water, to intemperance, to deprivation of fresh vegetables and fruit, to impure or insufficient or salt food, to detention in crowded barracks or transport ships, to insufficient clothing and bedding, to poisoning by retained excretions, to the use of drastic purgatives, &c. All cachectic states of the system predispose to it, in those countries where paludal fevers are rife. Moreover, intermittent or remittent fevers and dysentery often coexist, or they succeed each other in the same individual. Whether malaria can be said to be an exciting cause of dysentery, as it is of paludal fevers, is uncertain.

Symptoms.—At the commencement there will be found general uneasiness, pains in the abdomen of a griping character (*tormina*), with a frequent inclination to go to stool. This necessity being gratified, the action is followed by relief. As the disease becomes developed, and as ulceration or sloughing commences, the desire to empty the bowels gets more frequent and imperative, while the ease which succeeds is more transient. The evacuations are thin, mucous, and bloody; and frequently they are mixed with small, hard, separate lumps of fæces, termed *scybala*. The scanty evacuations soon produce distress rather than relief. The patient is constantly tormented with tenesmus and griping; the stools become fetid, dark-colored, and mixed with blood and purulent matter and shreds of lymph; while the bladder sympathizes with the rectum, causing frequent micturition. The urine also is high-colored, and gives rise to scalding when passed: sometimes there is strangury.

With regard to the other symptoms it must be noticed, that in all instances there is more or less fever with constitutional disturbance. In mild cases the fever is slight; and there will be neither depression, nor loss of appetite, nor an unnatural appearance of the tongue. But usually complaint is made of restlessness and inability to sleep; the countenance is anxious; and there are troublesome cramps. The tongue is furred, and the papillæ prominent; the pulse is frequent and small; skin harsh, hot, and dry; thirst urgent, with a total disgust for food; while there are fits of dyspnœa, and great prostration. Supposing that the patient recovers, the symptoms of amendment set in very gradually, beginning with an abatement of the purging and pain; while for some few weeks we never can feel certain that a relapse may not suddenly take place. Convalescence is usually protracted. On the other hand, in fatal cases, the abdomen becomes tense and full and tender, especially on pressure; the pulse gets weaker; the tongue is found dry and red and glazed, with aphthæ about its root and on the insides of the lips and cheeks; and there will be continued wakefulness, or short disturbed snatches of sleep. The evacuations are now extremely offensive and shreddy and watery; there is a repulsive corpse-like odor about the body; hiccup comes on, with great exhaustion and emaciation; and then death soon follows.

During the American war there were many cases of chronic camp diarrhœa, in which, after the patients had passed two or three loose stools daily for several days, acute dysentery set in suddenly. Frequently, in addition to severe tormina and tenesmus, there would be low fever and muttering delirium, succeeded by fatal sinking at the end of a few days. After death, the ulcerated colon was found coated with croupous lymph. In other instances, such complications as serous apoplexy, diphtheria, pneumonia, albuminuria, &c., were met with.

Complications.—This disease may become complicated with some form of

continued fever, with scurvy, with enlargement or inflammation of the liver, or with hepatic abscess. The two latter occurrences are so frequently met with in hot climates, that in all cases the liver should be daily examined; such examinations being continued for some short time after the prominent symptoms have ceased. Whether dysentery and abscess of the liver have any mutual relation is still undecided; but the balance of evidence seems to be in favor of their being dependent on the same cause, though unconnected with each other. According to Dr. George Budd, the abscess is the consequence of the dysentery; the former resulting from the fetid gaseous and liquid contents of the bowel, or the unhealthy pus produced by its ulceration, being absorbed and conveyed immediately to the liver. In opposition to this view, it is to be noticed, that out of many hundreds of cases of dysentery which occurred in Millbank prison during seven years, not one (according to Dr. Baly) was complicated with hepatic abscess.

Terminations.—Dysenteric inflammation, when violent, may end in perforation of the bowel and fatal peritonitis; or in rupture and fecal abscess; or in pyæmia and secondary abscesses; or in healing of the ulcerations, with subsequent troublesome constipation from the contraction of the cicatrices; or in fatal exhaustion, particularly where the mucous membrane has got sphacelated.

When the disease becomes *chronic*, it is often most intractable. There is usually atrophy of the mucous membrane, with degeneration of the glands, or imperfectly cicatrized ulcers remain in the mucous lining of the cæcum, colon, or rectum. Many of these cases ultimately recover; but in other instances the sufferer gradually wastes away, the skin is rendered harsh and dry and scaly, there is improvement one day with a relapse the next, the tongue is florid and glazed, the discharges of fecal matter mixed with thin pus and blood are most offensive, while the griping pains and tenesmus, &c., exhaust the patient so thoroughly that death is looked forward to as a welcome source of relief.

The immediate mortality from this disease, in hot climates, varies from five to thirty per cent. of those attacked. According to several authorities, where it does not at once end fatally, it leads (when once fairly impressed on the system) to so much suffering and slow exhaustion that life is ultimately destroyed by it.

Pathology.—By many good observers this disease is thought to commence as an affection of the tubular and solitary glands of the large gut, which glands get enlarged and filled with a jelly-like substance. After a time the glandular structures rupture and an ulcer is formed; and this happening in several parts, large patches are produced by the ulcerations running into each other. Then, too, the intervening mucous membrane gets inflamed and pulpy, secretes a large quantity of mucus, and readily bleeds under the influence of any irritation. After death the most extensive and ragged ulcerations are found, with perhaps portions of the mucous coat in a sloughy or gangrenous condition. The mesenteric glands are often swollen.

Rokitansky states that the dysenteric process is divisible into four degrees or stages, ranging from inflammation and softening of the mucous lining of the colon to complete mortification. Dr. Parkes considers that ulceration is always present, and that the solitary glands are much affected. Dr. Habershon thinks it probable that the diseased condition is closely allied to that of the pharynx in diphtheria, and that in severe examples the membrane rapidly sloughs, without antecedent ulceration.

Treatment.—Bloodletting, both by the lancet and by leeches applied in

the track of the colon, is usually recommended; this practice being, I believe, still adopted by many. In the dysentery of this climate it is worse than unnecessary to bleed, while it is equally injurious to administer large doses of calomel. And this is probably the case in most countries; but it is certainly so when the morbid action has advanced so far that there is ulceration running into gangrene of the affected tissues.

During the early stages our object ought to be to soothe the inflamed membrane, and to remove all sources of irritation. Hence, demulcent drinks must be copiously given, while the diet is to be free from stimulants and of the lightest kind—farinaceous food, cream or milk, calf's-foot jelly, and thin broths. Perfect rest in bed, in a well-ventilated apartment, is desirable even in mild cases. The warm bath can be frequently employed with great advantage; while the wet compress, fomentations, and hot poultices always afford great relief. When we fear the lodgment of scybala a few doses of castor-oil may be given, the action of which should be aided by enemata of gruel. The bowels having been thus acted on, no remedy appears to exert so good an effect as ipecacuanha. This agent seldom produces nausea and vomiting when given in large doses, while it is beneficial by its action upon the skin, by causing an increased secretion of mucus, and by restoring the deranged capillary circulation of the liver and intestine to its normal state. The best mode of administering this drug, either in the dysentery of tropical regions or in such severe forms of it as occasionally occur in this country, is as follows: A large and hot linseed poultice, containing two or three tablespoonfuls of mustard, is to be applied over the epigastrium. Next, a full dose of opium, proportionate to the age, is to be exhibited in the form of an enema or suppository, and then thirty or forty-five minutes afterwards (the use of fluids having been interdicted for three or four hours previously), a dose of from thirty to sixty grains of ipecacuanha powder should be given in the form of a bolus, or wrapped up in wafer-paper, or suspended in a small mucilaginous draught. A second dose is seldom needed; but if required, it may be ordered at the end of six, twelve, or twenty-four hours.

When the dysenteric inflammation has reached an advanced stage (when there is extensive disorganization of tissue) then there are still two points to be aimed at, viz.: to support the general strength, while the diseased structures are to be kept as quiet as possible. Under these circumstances, ipecacuanha, followed by tonics and astringents and opiates, are to be the tools with which we work. Supposing the patient to be very weak and anæmic, we may try such remedies as salicin, quinine, bark, cascarilla, or some mild preparation of steel; although if the dejections continue abundant and frothy and sanguineous, we are first to use bismuth, gallic acid, kino, logwood, iron alum, or sulphate of copper. In both classes, but chiefly in the last, opiates by the mouth or subcutaneously, or often preferably by the rectum, will be invaluable. The diet ought to be generous; milk, raw eggs, strong broths, restorative soup (F. 2), ripe grapes, and, perhaps, alcoholic stimulants, well diluted, being necessary. In scorbutic cases a free supply of lemon- or orange-juice is to be allowed.

For chronic dysentery the patient must seek relief in a mild, dry, equable climate. If unable to obtain change of air, he should be treated according to the principles just inculcated. The different preparations of bael or Bengal quince are much used in India. They seem to have a twofold property, first being astringent and then aperient; and they are especially recommended where the stools are frequent and mixed with blood and mucus, while the system is free from fever (F. 97). The remedy which seems to have had the most salutary effect in the chronic dysentery from

which our soldiers suffered in the Crimea, is morphia. One grain of the hydrochlorate was given twice or three times a day, with some aromatic spirits of ammonia and nitrous ether.

XV. DIARRHŒA.

In most works on practical medicine many varieties of diarrhœa are described, such as the feculent, the bilious, the mucous or catarrhal, the dysenteric, &c. These subdivisions are, however, quite unnecessary. It would seem much better to apply the term *diarrhœa* [*Διαῤῥέω* = to flow through] to all examples of simple purging; that is to say, to those cases in which the alvine evacuations are frequent, and loose or liquid, without any coexistent inflammation of the intestines.

Causes.—The causes of diarrhœa are numerous: the most common being overfeeding, or the use of improper food—such as unripe fruit, raw vegetables, sausages, pork, veal, goose, duck, salmon, &c. It may follow exhaustion consequent upon starvation, or the drinking of foul water, or the inhaling the fumes from decaying animal or vegetable matter, or great mental emotion, or exposure to damp and cold, or to too great heat. From the latter cause, relaxation of the bowels is common during the summer months; and hence it is frequently termed summer or English cholera. Diarrhœa is often also a symptom of many different diseases, as of phthisis, typhoid fever, congestion of the liver, &c. But when simple diarrhœa prevails in a household, or in a community, it may be set down as due to some unhealthy state of the atmosphere, or to the use of contaminated water, or to the consumption of bad food.

Symptoms.—In addition to the purging there is generally some degree of nausea, a dirty or furred tongue, foulness of the breath, flatulence, and tenesmus. There are also griping pains, acid eructations, &c. Moreover, the stools are unhealthy; either consisting of liquid fæces, or of a watery feculent mucus, or of a thin frothy serum, or of a pale yeast-like matter. In severe summer cholera the evacuations are often composed chiefly of bile, the pains in the abdomen become violent, there are cramps in the legs, the patient complains of being chilly, and the depression is frequently great.

The way in which hemorrhage occurs, the blood being passed by the rectum, has already (p. 92) been noticed. The reader may, however, be reminded that blood sometimes appears in the stools from engorgement of the portal system, causing congestion of the whole mucous lining of the alimentary tract; such engorgement being due to disease of the lungs, heart, or liver, obstructing the circulation. Hemorrhage will also arise from ulceration—either simple or malignant—of the stomach; from disease of the intestinal glands, as in typhoid fever, and sometimes in phthisis; from ulceration about the colon or rectum, as in dysentery; from polypus of the rectum, or from cancer of this part; and lastly, from the giving way of one or more of the hæmorrhoidal veins, as in instances of piles. When the blood is mixed with fecal matter and intestinal mucus, the case may be mistaken for simple diarrhœa, unless the practitioner examine the stools himself, as he ought to do in most of these cases.

Prognosis.—This is usually favorable, except in the diarrhœa of young children, or of old people with enfeebled frames, or in purging complicat-

ing some exhausting disease. Nevertheless, the fatality of diarrhœa has much increased since 1838, when the deaths from it in England amounted to 2482. Thus, in 1847 the number was 11,595; in 1857, 21,189; in 1861, 18,746; in 1863, 14,943; in the three following years, 16,432, 23,531, and 17,170.

Diagnosis.—Diarrhœa is distinguished from dysentery by the absence of blood from the stools, and by the comparative mildness of the tenesmus and general disturbance. From cholera it is diagnosed by the comparative mildness of the symptoms, &c., though this affection often commences like a common diarrhœa.

As an important point in practice, it must be remembered that in examples of fecal accumulation there is constantly tenesmus with the frequent passage of small quantities of liquid fæces. I have seen more than one instance where the patient's life has been endangered by recourse being had to chalk mixture and opium, when the removal of a hard mass with the help of enemata and the scoop ought to have been adopted. Again, cases in which the power of the sphincter ani has become diminished, either from paralysis or from very great prostration, are sometimes mistaken for diarrhœa. Where the rectum is irritable and the sphincter weak, matters which would otherwise remain some hours and accumulate, pass away at once. Of course no benefit can arise from treating such cases as if they were instances of simple purging. The recumbent posture, ferruginous tonics, cold sponging or bathing, and good diet will more probably effect a cure.

Treatment.—This will manifestly depend upon the cause. When the purging arises from the presence of some offending matter in the intestinal canal, the expulsion of such matter must be aided by administering from five to ten grains of powdered rhubarb, or about two fluid drachms of the tincture of rhubarb, or half a fluid ounce of castor oil, combining a few drops of the liquid extract of opium with the draught if there be much pain. Granting no such cause exists, we can endeavor to relieve the symptoms by a draught of ether and opium (F. 85), or by two or three doses of calomel and opium (F. 25), or by the chalk mixture with catechu, &c. (F. 97), or by the officinal aromatic powder of chalk and opium, or by sulphuric acid and opium (F. 100), or by a mixture of matico and rhatany (F. 105), or by kino and ipecacuanha and logwood (F. 108). Many cases may be quickly cured by thoroughly washing out the rectum with warm water, immediately afterwards employing the officinal opiate enema or a suppository of opium (F. 340). Ten or fifteen grains of tannic acid added to the enema will now and then increase its efficacy. Where the irritation appears to be kept up by fecal fermentation, no remedy proves more serviceable than fresh vegetable charcoal (F. 98). Ipecacuanha and opium are especially useful in the diarrhœa of children, or in that of adults when due to inflammatory congestion of the mucous membrane of the intestine (F. 333, 324, 339). Attention must invariably be paid to the diet; emollient drinks, tapioca or sago or milk arrowroot, custard or baked rice puddings, and white fish only being allowed during as well as for a few days after the attack. If any stimulant be needed, a little cold brandy and water may not prove injurious. Moreover, where the intestinal canal is irritable, subjecting the individual to attacks of diarrhœa on slight causes, great benefit will often be derived from constantly wearing a flannel-roller wound twice or thrice round the abdomen. This practice has also been found useful by those who have resided in tropical climates, and who, having suffered from yellow fever, dysentery, &c., are liable to looseness of the bowels.

XVI. MALIGNANT CHOLERA.

era [*Χολὰς* = the bowels + *ῥέω* = to flow; or, according to Dungli- ɔm *Χολὴ* = bile + *ῥέω*, because it arises principally from a super- .nce of acrid bile] is probably the most fatal disease known in the of medicine. The characteristic features of it are vomiting, purging :rous or rice-water evacuations, cramps, diminution of animal heat, sion of urine, collapse, and secondary fever. It is variously spoken *falignant*, or *Epidemic*, or *Asiatic*, or *Serous*, or *Algid Cholera;* this erm [from *Algeo* = to be cold] having reference to that diminution nal heat which is one of the signs of this disorder.

gnant cholera has prevailed at various times in different parts of or centuries. But until 1817 the disorder was probably peculiar to ty, and badly-housed, and badly-fed natives. In this year, however, ease seemed to become epidemic, pestilential, and contagious, com- g that deadly march onwards which did not cease for seventeen Sir Archibald Alison tells us that, "after the signature of the of alliance with Scindia, on November 5th, 1817, the cholera, then first time known in British history, broke out with the utmost e in Lord Hastings's army, and from the very outset committed the eadful ravages. The year had been one of scarcity, the grain was ior quality, and the situation of the British cantonment low and hy. Everything was thus prepared for the ravages of the epidemic, oon set in with terrible severity. For ten days the camp was noth- an hospital; in one week 764 soldiers and 8000 camp followers per- At length the troops were removed to higher and more airy canton- and upon this the malady ceased—a memorable fact for the instruc- future time. As was afterwards often experienced, the ravages of tilence were greatest among the lowest portion of the people; only ropeans perished in November, but above 10,000 natives fell victims malady. When it spread to Calcutta it destroyed 200 a day for a ne, chiefly among the worst-fed and most destitute of the people."* an be very little doubt that cholera was first imported into England ber, 1831. According to Dr. William Farr, it has probably always in England; but from the description given by Sydenham, in the enth century, it may at least be doubted whether the disease he of was not of the nature of dysentery rather than identical with that onsideration.

ıre just as ignorant of the reason of its origin, as we are unable to why it should have raged in this country in 1831–32, 1848–49, 4, 1865–66, and not during the intervening years. What our ex- e has taught us is this: That cholera attacks the poor in a much oroportion than the rich; and that as we prevent the distribution of

especially to have proved that the poverty-stricken denizens of an unhealthy neighborhood, supplied with pure water, are more certain to escape cholera, than are the wealthy residents of fashionable parks and squares if they consume water contaminated with leakages from drains and cesspools.

The first two epidemics of this disease in England (1831–32, 1848–49) were the most severe; and each continued fifteen months. They began in October, spread gradually, increased, and then as spring advanced gradually subsided only to burst out afresh with the hot weather. It is worthy of notice, that in both epidemics, the cholera entered England after the wheat harvest was over, at the close of the hot season; and that it was most fatal during and after the wheat harvest of the following year. The number of fatal cases during the first invasion is unknown, as no registration of death-causes then existed; but according to Dr. William Farr, the deaths of 52,547 persons in the United Kingdom, were reported to the Board of Health. In 1848–49 there were 55,181 deaths from this disease in England alone, not including 28,900 from diarrhœa: the mortality from these two causes, in 1849 only, being respectively 53,293 and 18,887.

In 1853 there were 32 deaths from cholera in London between the commencement of February and the end of July; in August, 48 deaths; in September, 99; in October, 293; in November, 318; and in December, only 62. During the early part of 1854, the disease had nearly disappeared: until the 1st of July only 16 fatal cases occurred. But it now again became epidemic, and between the 1st and 22d of July, the mortality was 38; during the week ending 29th July, there were 133 fatal cases; and the attacks then rapidly increased, until in the week ending 9th September there were 2050 deaths from cholera, and 276 from diarrhœa. Having now attained its maximum, the affection slowly declined, but did not entirely cease until the end of December; the total mortality from it in the metropolis in 1854 being 10,738. Taking the whole of England and Wales, the deaths registered from cholera in 1853 were 4419, and from diarrhœa 14,192; while in 1854 there were 20,097 from cholera, and 20,052 from diarrhœa.

The estimate has been made by Dr. Farr, that little less than five millions of the people of the United Kingdom were attacked by cholera or diarrhœa in the epidemics of 1848–49 and 1853–54; and that a quarter of a million of those so attacked, died. The mortality from cholera and diarrhœa in 1849 was at the rate of 41 in 10,000; while in 1854 it was at the rate of 22 in 10,000 of the population.*

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more than 68 cubic feet for each person. Cholera swept away 60 of these inhabitants in less than a week. At the county jail of the same town, the breathing-space allowed to each prisoner ranged from 819 to 935 cubic feet. While the poor were being destroyed in the workhouse in this wholesale manner, not a single case of cholera or of diarrhœa occurred among the prisoners.

Again, cholera is a constant attendant at native festivals in India, when crowds of people are collected together. At the Juggernaut it was an annual visitant. The town of Pooree contained 35,000 inhabitants, while the number of pilgrims sometimes amounted to 150,000. The inhabitants were usually healthy in June or July, just prior to the festival; but immediately on the arrival of the pilgrims, when the lodging-houses became crowded with inmates, and the streets and fields impregnated with the stink of decomposing excrement and urine, cholera would suddenly break out and destroy hundreds in a few days. On the dispersion of the crowd the disease disappeared as suddenly as it had been generated. So also fresh outbreaks of cholera occur almost annually at the festival at the large pagoda in Conjeiveram, whence the disease is carried to Madras, only forty-five miles distant.

* In May, 1854, cholera broke out in Port Louis; and although prompt measures were taken to arrest the progress of the disease and to mitigate its force, they proved of no avail. The average deaths in this town before the breaking out of the disease

With regard to the epidemic of 1865–66, the victims in the former year were comparatively few. Then the greater proportion of cases occurred at Liverpool and Southampton. At the latter town, between September 24th and November 4th, there were 60 attacks with 35 deaths. From Weymouth the disease was conveyed by a farmer and his wife to their home in the village of Theydon-Bois, in Essex. From September 28th to October 6th inclusive, Mr. Radcliff tells us that eight members of this family were attacked with cholera—including the head of the house, his wife, and two servants. Of these persons five died. Within the same period, the family doctor was seized and died after ten hours' illness. A laborer on the farm also died; a woman who laid out his corpse was taken ill on October 10th, and died the next day; while a grandchild of this woman had choleraic symptoms on October 31st, and died in thirty-six hours. Still, cholera did not spread beyond the village. In London, few, if any, cases were met with until July, 1866; and then the deaths from it during each of the five weeks between July 1st and August 4th were 11, 63, 481, 1097, and 1178. The total number of deaths from cholera in the metropolis during 1866 was 5596; those from diarrhœa amounting to 3147. The ravages of the disease were almost entirely confined to the poor districts in the east of London; being those neighborhoods which were supplied with water from the river Lea. In the whole of England and Wales, the deaths registered from cholera in 1865 were 1291, and from diarrhœa 23,531; the numbers in 1866 being 14,378 for the former, and 17,170 for the latter. Combining the totals for the two diseases in 1866, the mortality was at the rate of 15 to every 10,000 of the population.

Symptoms.—A typical case of cholera goes through three stages. In the first, there is diarrhœa; in the second, there are in addition to the purging with rice-water evacuations, vomiting, severe cramps, laborious respiration, lividity and coldness of the body, sinking of the pulse, and collapse; while if death do not intervene, there is the third stage of reaction or consecutive fever, which continues until all danger is over.

Considered somewhat more in detail, the chief symptoms may be described as purging of a peculiar flocculent rice-water kind of fluid; copious vomiting of thin colorless matters, without any odor; severe cramps in the lower extremities and abdomen, rendering the muscles as hard as wood, or drawing them into knots, as it were; sometimes, in the early stage, albuminuria, followed by complete suppression of urine; thirst, usually very urgent; and diminished circulation and impeded respiration, causing intense prostration, with icy coldness of the surface of the body, the nose, the tongue, and even the breath. Frequently, noises in the ears or head are much complained of; while there may likewise be dizziness, dimness of sight, and deafness. There is perhaps oppression and pain at the præcordia. The lividity or blueness of the lips, and of the surface generally, is remarkable; while the skin gets shrivelled and bedewed with a death-like dampness. There is also an alteration of the voice, which becomes whispering and unnatural, owing to the volume of air in the lungs being dimin-

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were 70 a month; afterwards they exceeded this number daily. The population of Port Louis and its suburbs was about 50,000; and by the end of May it became reported that 10,000 of the inhabitants had fled. On June 5th there were said to be 170 deaths, and on the 6th 130. The progress of the disease was so rapid, that in some cases scarcely two hours elapsed between seizure and death. The whole capital became a scene of desolation: nearly one-half of the houses were closed, and in the streets few persons were met except those who hurried along with mournful Three Visits to Madagascar, during the Years 1853, 1854, 1856. By the Rev. William Ellis, pp. 111 to 114. London, 1858.

ished. The shrinking and pinching of the face, and indeed of the whole body, are peculiar. Pains across the loins are common. Notwithstanding the diminution of temperature, the patient probably complains of oppression; while he often prefers to lie uncovered. Generally, during both collapse and reaction, the temperature in the vagina or rectum is three or four degrees higher than in the axilla. The sharp pinched appearance of the features, the muddy-looking complexion, and the sinking of the eyeballs with flattening of the corneæ, are so characteristic, that the expression they give rise to is known as the *facies choleritica*. Then there soon follows a gradual lessening of the breathing; a diminution or absolute disappearance of the pulse, the heart's action being almost or quite inaudible; and, at length, a complete arrest of the circulation. In all such cases the intellect remains clear until the last; the sufferer being sometimes hopeful, sometimes quite callous to his fate. Death generally takes place in from three to twenty-four hours. Patients who survive beyond this period frequently show signs of amendment, and occasionally rapidly get well. The stage of reaction is of variable duration. During its progress the sickness gradually lessens, the body regains its warmth, the face gets flushed, the respiration and circulation are restored to their natural state, all uneasiness and restlessness subside, urine is voided, and perhaps some dark offensive stools are passed. But every now and then it happens that the improvement is only transient. Danger may arise from the occurrence of great cerebral or pulmonary congestion. Or the sufferer subsequently dies poisoned by his own secretions—by the continuance of the suppression of urine; death being then preceded by headache, drowsiness, tonic or clonic spasms, vomiting, stertor, and coma or delirium. In other cases, too, instead of the mild febrile exacerbation, which subsides gradually in a few days, this consecutive fever proves to be of a more severe type; and the patient sinks into a low typhoid condition, from which he only recovers very slowly, if at all.

An attack of cholera may be preceded by slight diarrhœa, but sometimes it comes on suddenly without any warning. We are told that during the epidemic of 1866 it was no uncommon thing for a man to go to bed perfectly well, to wake at 3 o'clock in the morning with vomiting and purging, and to be admitted into the London Hospital at 10 A.M. in a state of extreme collapse.

If we examine the stools in cholera we shall find that they consist of an abundance of water, a small quantity of epithelium, granular corpuscles, vibrions, albuminous material, a trace only of biliary matter, and a large amount of salts—particularly of chloride of sodium. The rice-water appearance is due to the flakes of an albuminous character which float in the colorless fluid. When, during the stage of collapse, the stools are of a pinkish or blood tint, recovery very rarely occurs.

The poison of cholera probably exerts some peculiar influence over the ovarian or uterine system. Thus, during the stage of collapse, women frequently have a sanguineous discharge from the uterus, sometimes amounting to hemorrhage. In the early months of pregnancy abortion usually occurs, such cases seldom getting well. Where pregnant women have died during the latter months of gestation, the fœtus has always been found dead, though removed by abdominal section directly after the mother's decease. In suckling women the secretion of milk is uninterfered with; the mammary glands continuing to act freely, though the biliary and renal secretions are suppressed.

Certain complications are now and then met with. The chief are: a roseolar rash, which may cover the body or only appear in large irregular patches; swellings of the tonsils, or of the sublingual and parotid glands;

bed-sores; ulceration and sloughing of the corneæ; eruptions of urticaria, or of herpes; aphthæ about the mouth and throat; bronchial catarrh, or even acute bronchitis, or a low form of pneumonia; and inflammations of the vaginal labia, &c., with muco-purulent discharge.

The mortality is always greatest at the commencement of an epidemic. Between July 10th and August 30th, 1866, there were admitted into the London Hospital 509 cases of cholera, of which number 54.9 per centum died. The proportion of deaths decreased week by week; that of the first week being 85, and of the last 37 per cent. When the disease proves fatal, death occurs within 24 hours in about 42 per cent., and within 48 hours in 67 per cent. During the year 1866, out of 14,378 deaths from cholera in England the duration of the attack was specified in 8951 instances. Of these, 3981 died within 24 hours of the commencement of the attack; 1688 had a duration of one day, 819 of two days, 655 of three days, 501 of four days, 320 of five days, 239 of six days, 308 of seven days, 104 of eight days, 57 of nine days, 125 of ten days, and 154 of fourteen days and upwards. After the fifth year of life the fatality increases with the age. Thus it has been shown that of 100 men attacked at the age of 25–35 about 36 died, while of 100, between 35 and 45, some 44 died. The disease is very fatal to infants.

Pathology.—The only explanation which can be given of the cause of cholera is, that it is due to some *materies morbi*—a septic agent; the existence, increase, power, and transmission of which from place to place is favored by some particular state of the atmosphere associated probably with a high temperature. The action of the poison is undoubtedly encouraged by filth of all kinds. As far as I can glean from the recorded evidence—and I have carefully studied the subject—it certainly appears to me to be, to a certain degree, contagious; in other words, I believe that human intercourse has a share in propagating the disease, though it is not the only means of effecting its diffusion. We must remember, however, that in cholera the discharges appear to be the principal means of propagating the disease, and not the emanations from the skin and lungs, as in fever. Hence the importance of thoroughly disinfecting these noxious discharges, the highly infective power of which renders the smallest quantity of them capable of imparting most dangerous qualities to large volumes of water.

Whether the cholera poison (*cholerine* or *cholrine*) enters the blood through the skin, through the lungs, or through the alimentary canal as Dr. Snow believed, is a question which cannot be said to have been satisfactorily solved. But an examination of the evidence adduced to prove the latter hypothesis certainly serves to show that much can be urged in favor of the theory that the poison is swallowed with the food or drink, is reproduced in the alimentary canal, and being discharged with the excretions propagates the disease by finding access in the same way to the stomachs of others. In the case of the farmer and his wife at Theydon-Bois, near Epping, already mentioned, it was found that the drinking-water of the household was drawn from a well polluted by a leakage through the soil-pipe of the water-closet. This closet, of course, received the evacuations of the farmer and others seized with cholera; and it is probable that the whole family would have been destroyed had not the further use of the water been stopped after the doctor's death. Dr. Snow advanced the opinion in 1849 that cholera-cells, thus distributed in water, were the sole means of propagating the disease. Dr. Richardson has contended that the cholera matter is an alkaloidal organic poison, soluble in

water, but admitting of deposit on desiccation, and that this poison passes easily from one person to another under certain circumstances.

The opinion has been held for many years, by different physicians, that the poison of cholera exerts some especially injurious influence over the function of respiration. This was Mr. Hutchinson's view in 1832. Dr. E. A. Parkes believes that there is a more or less complete failure in the transmission of blood through the lungs, and that the cause of this failure is probably to be found in the blood itself. "That there is some impediment or arrest of the circulation in the capillary system generally, and in the pulmonary capillaries in particular, appears almost certain; and it is by no means improbable, from the whole bearing of the facts, that this is due to a chemical change in the fibrin, and in its mode of combination, consequent on the direct action of the active cause."* Dr. George Johnson, following in the footsteps of Dr. Parkes, remarks that the one great fact is this: "That, *during the state of collapse, the passage of blood through the lungs from the right to the left side of the heart is, in a greater or less degree, impeded.*"† But he differs from this gentleman as to the cause of this impeded circulation; his hypothesis being that the poisoned blood causes contraction of the muscular walls of the minute pulmonary arteries, the effect of which is necessarily to diminish or arrest the flow of blood through the pulmonary capillaries. Whether this view be correct is undecided. It may be remembered, however, that Dr. Parkes distinctly shows there is no evidence of obstruction in the pulmonary arteries, for there are cases where the lungs are found excessively shrunk and containing no blood or serum, and yet on cutting through the roots no blood escapes, and all the cavities of the heart are nearly empty. Dr. G. Owen Rees also expresses his belief that no such arrest of circulation occurs as Dr. Johnson supposes. At Guy's Hospital ten careful examinations were made by Dr. Moxon of patients who had died collapsed; and in every case the lungs were found to contain blood, which flowed freely from the pulmonary veins as well as from the arteries on making sections of these organs. Thus, there were "ten consecutive cases of fatal collapse in all of which the blood was not arrested in the branches of the pulmonary artery, but was found filling the pulmonary veins quite as completely as the arteries; and more than this, it had passed through those veins and reached the left cavities of the heart."‡

Post-mortem examinations have thrown but little light on this disease. As one of the foci of the morbid action, we naturally look first to the gastro-intestinal mucous membrane; but beyond distension of the follicles with serum, an œdematous condition of the mucous lining, patches of venous congestion, and here and there rupture of the vessels producing ecchymosis, we find nothing. The blood is altered more or less. This fluid is usually of a tarry appearance and consistence, the proportion of water being much diminished, the fibrin being either reduced in quantity or affected in character, and the corpuscles increased; while the serum is rich in albumen, it contains a slight excess of urea, and its salts collectively are perhaps diminished. The brain, spleen, and liver are usually found healthy; Dr. Ayre's statement that the latter organ is always congested, having been contradicted by other observers. The quantity of blood in the lungs varies: sometimes these organs are congested, but more frequently anæmic. They are also often collapsed, there being a deficiency of air in the tubes and

* Researches into the Pathology and Treatment of the Asiatic or Algid Cholera. By E. A. Parkes, M.D., &c., p. 118. London, 1847.

† Notes on Cholera, its Nature and its Treatment, p. 42. London, 1866.

‡ The Lancet, p. 720. London, December 29th, 1866.

cells. The heart is often flaccid; its right side being dilated, and the left contracted, though occasionally all the cavities are contracted. The kidneys are sometimes discovered gorged with venous blood.

There appears to be no relation between the quantity of fluid lost by purging and vomiting and the malignancy of the disease. At all events, a large number of cases are reported where the advance towards a fatal termination has been steadily progressive for some hours after all discharges have ceased.

The bodies after death are found much shrunken, and of a dusky or livid color; while usually putrefaction is more delayed than usual. Very remarkable contractions of the voluntary muscles are sometimes noticed shortly after death from this disease. In the *Cholera Gazette* for 1832, it is mentioned, that in India the dead bodies of the soldiers were so violently convulsed, that their comrades "in order to calm the timid, bound the limbs to the bed-frame." Another notable circumstance is, that the temperature of the body often rises after death from cholera; the increase of heat, even to perhaps 103° Fahr., being maintained for many hours. This rise of temperature sometimes happens together with the muscular contractions, but often also without.

Causes.—The cause of cholera has been shown to be the presence of a morbid poison in the blood. The nature of this substance is unknown: its effects are but too prominent. It has been proved that paper saturated with cholera flux, and dried, when eaten by mice produces the disease. Thus, of 148 mice experimented on by Dr. Sanderson, 95 exhibited no symptoms, 53 became affected, and 31 died.

When an epidemic of cholera is prevalent, there are certain conditions which render individuals liable to the disease. These *predisposing causes* are undoubtedly the use of bad, unwholesome food; such as stale meat or fish, shell-fish, sausages, high game, bad vegetables, unripe fruit, impure water, &c. Nothing can be more injurious at any time than the drinking of water contaminated with sewage, but in cholera seasons, such a proceeding merely invites the disease. Hence, to avoid all risk, the drinking-water is first to be boiled; and then, when cold, to be filtered through a mixture of sand and charcoal. The effect of exhalations from badly constructed sewers is highly injurious; the influence of noxious trades and nuisances is powerful; while intemperance, personal uncleanliness, vitiated damp air, and insufficient protection against cold and inclement weather, are all prolific predisposing causes. So again, anything which lowers the vital powers will predispose; as great fatigue, too long abstinence from food, diarrhœa, &c. Hence, in cholera times, it is most important to reside in a healthy house, situated in a clean and airy and dry locality; to live by rule; and to strictly avoid the use of active purgative medicines. Equally necessary is it to check any tendency to looseness of the bowels by adopting the recumbent position, and by the employment of plain farinaceous food directly there are any symptoms of diarrhœa. If it be certain that there is some offending matter in the intestines, keeping up the irritation, this peccant substance ought to be expelled by a dose of rhubarb, or mercury and chalk, or castor oil. When there are loose watery stools, after all injurious matters have come away, then some simple astringent, containing a little opium and spirit of chloroform and aromatics, had better be prescribed, together with a flannel belt round the belly. The looseness does harm by causing debility, and so predisposes a person to receive the choleraic poison. I do not believe, however, that common diarrhœa can produce the specific poison of cholera, as some imagine, any more than it has the power of giving rise to the poison of small-pox or of measles.

Treatment.—The doctrine that prevention is better than cure receives a most apt illustration in this terrible disease. Indeed it is folly to talk of curing cholera, when the very principles which should guide us are undecided. Until we know whether recovery depends upon a persistence of the intestinal evacuations, or on a suppression of them, how can we venture to prescribe? That patients have got well under all kinds of treatment is universally allowed; but the same can be said of every disease. In the present instance, in nineteen cases out of twenty the drugs which are swallowed are quickly returned unaltered in the vomit or stools; or else they mingle with the fluids in the stomach and bowels without getting absorbed until the crisis is over, and then they may prove most mischievous. Prior to the last epidemic there were very few practitioners in England who did not believe it to be a duty to stop the so-called premonitory diarrhœa by astringents and opiates; and reports of thousands of cases might be collected where men have believed that by checking this looseness they have prevented the development of the stage of collapse. But it is exceedingly probable that the theory on which such practice is based is quite fallacious. I do not say positively that it is so. The whole subject has been so complicated by the publication of immature hypotheses and extravagant conceits, while the views held by different men seeing the same class of cases in the same institution are so opposite, that it is impossible to form any trustworthy opinion at present. Even physicians usually regarded as careful observers only seem to have learned from the last epidemic, that the lessons they had taught with great energy during and after the preceding ones possess no value—in reality that they have a mischievous tendency.

Taking these circumstances into consideration the bewildered practitioner will still ask what is to be done? Now in the *first* place, I would strongly advise him to scout all extravagant plans of treatment; and at the same time not to worry his patient with nauseous remedies which, to say the least, have already been proved to be useless.* That we have

* Every article of the materia medica has been tried in this disease; large doses of calomel, opium, brandy, sulphuric acid, cajuput oil, castor oil, croton oil, creasote, chloroform, sugar, sulphur, acetate of lead, logwood, turpentine, chlorodyne, belladonna, atropin, tobacco, gallic acid, phosphorus, quinine, iodide of potassium, strychnia, alum, camphor, salt, ice bags to spine, bags of hot salt, warm water injections into veins and bowels, saline injections, emetics, oxygen gas, hot-air baths, venesection, &c., having been the favorite remedies. Directly a case recovers, the sanguine practitioner imagines that he has cured it, and immediately sets goosequill to paper to record his success. The consequence is, that the medical journals—and even the daily papers—in cholera times, are filled with letters and communications recommending the most opposite and violent remedial agents, in the most confident and dogmatic manner; these epistles not only frequently serving to show the weakness and credulity of the writers, but also tending to bring discredit on the medical profession generally.

Mercury has been highly praised by some practitioners, and especially by Dr. Ayre, who shows that of 725 unequivocal cases treated with it, 360 recovered. But it has been pointed out by Drs. Baly and Gull, in their Report on Cholera to the College of Physicians, that under opposite plans of treatment, the recoveries even in severe cases averaged from 45 to 55 per cent., according to the period of the epidemic. Consequently the facts adduced by Dr. Ayre are not worth much. Dr. George Johnson has strongly advocated the use of castor oil in very frequent doses (Medical Times and Gazette, September 9th, 1854). The Medical Council of the Board of Health, after investigating several cases treated by this agent, report, on September 20th, 1854, "From the above abstract, the details of which have been carefully investigated by the Committee, it appears that, in 89 cases of cholera, treated by 14 different practitioners, with castor oil, on the plan recommended by Dr Johnson, 68 were fatal; recovery having occurred only in 15 cases, while 6 remaining cases are still under treatment."

The plan of treatment which I have long thought most deserving of notice, since

no antidote to the poison of cholera is incontestable. Still we can be of some service. The patient is to be isolated as far as possible. He is to have

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it is certainly based upon a reasonable foundation, is that by saline, as suggested by Dr. Stevens (On Asiatic Cholera, &c., pp. 37–40. By Dr. William Stevens. London, 1853). On an extended trial, however, the failures with this plan have been numerous; though by no means as great as with astringents and various preposterous practices. The following is an outline of this practice as it was successfully used on a large scale, in the prison of Coldbath Fields, during 1832. Patients presenting the premonitory symptoms of diarrhœa and vomiting were removed into an observation ward, where an even temperature was constantly maintained. A Seidlitz powder was immediately administered: if sinking was felt without purging, three or four teaspoonfuls of Epsom salts were added to the powder. On these agents acting, plenty of thin beef tea, well seasoned with salt, was given; if there was any pain, a sinapism was applied to the gastric region; and thirst was relieved with seltzer, soda, or pure water ad libitum. Most of the cases were thus cured. If, however, cramps, coldness, or sinking of the pulse came on, the patients were considered as cholera cases in the second degree. The following was then administered about every half hour: Sodii chloridi gr. 20, Sodæ carbonatis gr. 30, Potassæ chloratis gr. 7, dissolved in water. If there was much irritability of stomach, a large sinapism was applied: if much heat or burning pain, an additional quantity of carbonate of soda was added to the mixture. In cases in the stage of collapse, a strong solution of the same salts, dissolved in hot water (100° Fahr.), was thrown into the bowels, and repeated every two or three hours. Sinapisms were also applied to the stomach, between the shoulders, &c.: and in the cold stage, frictions with warm towels were used. A pure air for the patient to breathe was considered of the greatest importance.

Mr. John Gason recommends (Lancet, July 28th, 1866), "The abdomen should be tightly swathed with a broad flannel binder sprinkled with chloroform, and the patient confined to the supine (horizontal) posture. As soon as the rice-water evacuations have commenced, and the fecal evacuations have ceased, a tightly rolled-up towel, in length about eight or nine inches, and in circumference about three inches, and moistened with an antiseptic, should be placed lengthways beneath the buttocks, so that the orifice of the rectum may be about midway on the roller. No evacuation of the bowels should be permitted, which will be completely obstructed by the towel. Drinks must be strictly withheld until choleraic symptoms have passed. Some drops of chloroform should be given frequently on sugar during the stage of collapse. Opiates and stimulants are positively injurious, as they increase secondary fever. This constitutes my plan of treatment."

In the Lancet, August 11th, 1866, Dr. George Rogers, of Long Ashton, near Bristol, says that he formerly advised "Calomel, twenty grains; ginger, five grains; opium, one-eighth of a grain; taken in a powder, every quarter of an hour, until warm perspiration was produced. In addition to this I would now suggest—as a diffusible stimulant, diuretic, and astringent—spirits of turpentine, in doses of from one to three drachms, frequently administered. Having found turpentine *most useful in arresting uterine hemorrhage, and diffusing an instantaneous warmth through the system*, I cannot but believe that its action would be most beneficial in cholera."

Dr. George Steel (Edinburgh Medical Journal, p. 242, September, 1866) wishes to call attention to the following case: "Feb. 20. Maxwell Gordon was seized this morning with vomiting and purging. Tongue livid. Pulse at the wrist scarcely perceptible. Countenance collapsed. Eyes sunk, with livid areola. Lips livid. Hands, feet, and arms blue and cold. Severe spasms in legs; pain and contraction at umbilicus. He was bled at the arm; and when about six ounces of blood were withdrawn, he became sick and vomited, and the vein was closed. The blood, thick and dark, was obtained with difficulty. Five pounds of hot water, in which twenty grains of tobacco had been infused, were injected into the intestines; and caustic potash was rubbed over the spine from one extremity to the other. This man became progressively worse, and when evidently moribund was subjected to the influence of galvanism. An incision was made over the glossopharyngeal nerve, where one wire was inserted, while the other was applied on the epigastrium. He was kept under the galvanic stimulus for three hours. *A powerful effect was produced on the respiratory function. The air expired grew warmer, and his lips and whole countenance, which had been previously livid, became*

plenty of fresh air. Care is to be taken that his drinking-water is pure, particularly that it has not been drawn from a well near any sewer, nor from any river which is used as a cesspool. The sick-room is to be emptied of furniture, curtains, and carpets, &c.; while sawdust wetted with diluted carbolic acid (1 part of acid to 40 of water) is an excellent disinfectant to sprinkle over the floor and in the neighboring passages, or sulphurous acid gas (F. 74) may be used for fumigation. All the excreta are to be received in pans containing Condy's or Burnett's disinfecting fluid, or carbolic acid; and then at once buried in the ground, or (not so advisable) thrown down the drains. Lastly, the soiled bed and body linen is to be soaked in a solution of chloride of lime, or in boiling water containing some of Condy's fluid, and afterwards washed with carbolic acid soap. It need scarcely be added that the importance to the community of these preventive measures against infection can scarcely be exaggerated.

Secondly, an attack of diarrhœa, when thought to be premonitory of cholera—choleraic diarrhœa—is on no account to be neglected. The sufferer is to be kept in bed, and carefully nursed; to drink freely of soda-water, or plain pure water, or cold tea, or milk and water, as often as he is thirsty; and to have farinaceous food with salted beef tea or mutton broth. Hot linseed or mustard poultices to the abdomen will relieve pain. A dose of sal volatile may well be given if there be any sinking or faintness. But all drugs having a tendency either to encourage or to repress the looseness had better be avoided. When the blind man at Laputa occupied himself in mixing colors for painters, it generally happened that he made mistakes; though he was much encouraged and esteemed by his brother projectors in the Grand Academy of Lagado.

Thirdly, during the stage of collapse, our efforts are to be directed towards the restoration of animal heat. Friction, turpentine stupes, sinapisms, dry hot flannels, &c., are all useful applications. The limbs should be covered with hot blankets, bottles of hot water may be applied to the feet, and warm enemata (either of simple water, or of water containing small quantities of

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of their natural color. He died about an hour after the galvanism was discontinued."

Suppose another epidemic of cholera to occur, how would the reader desire to be treated should he unfortunately suffer from an attack? Is it probable that he, as a medical man, will wish to take from one to twenty grains of calomel every fifteen minutes, or large doses of strychnia repeatedly, or half an ounce of castor oil every half-hour or so until between ten and eighteen ounces have been swallowed; or will he be bled, or allow leeches to be applied round his anus, or have blood transfused into his veins? Will he think it well to be narcotized, or stimulated, or cauterized, or galvanized, or corked up by Mr. Gason, or left to the delicate medication of Dr. George Rogers; or will he, as many have wisely done before, become restive and decline to be tormented and to have his stomach converted into a filthy drug store? Should he choose this course, it may comfort him to remember that, according to Mr. Bowerbank, in the prisons and hospitals of Jamaica when the patients refused to take the medicine prescribed, they were placed upon a mattress on the floor, with a bucket of iced water and a mug by their sides. For the most part, we are told, they received little if indeed any further care; while certainly they were not covered with blankets and rubbed, as the more tractable sufferers were. Nevertheless, the majority of those left to their own resources got well. So also, Dr. Parkes tells us that in India the Asiatics were seldom admitted into hospital until the disease was well marked, as they were either incredulous of the power of medicine, or resigned to the decrees of an inexorable fate; and that he never saw one of them bled. "Yet the mortality was certainly not greater than among the Europeans." (Opus citat., pp. 78 and 206.) And finally it is well known that during the epidemics of 1849 and 1854 very many of those attacked passed safely through the stages of collapse and secondary fever without any treatment; while in a number of other instances the same success attended the use of ice and beef tea only.

chlorate of potash and common salt) can be had recourse to. There is a prejudice against warm baths; but I believe it to be a fact, that at the London Hospital in 1866, prolonged immersion in such baths (at a temperature of 98° to 104° Fahr.) certainly did no harm; while it frequently proved so grateful to the patient, that it was somewhat difficult to get him out of the water. To relieve the thirst, plenty of cold water, or even iced water if wished for, is to be allowed. A weak saline lemonade, containing a little chlorate of potash and other salts (F. 358), has often been preferred to plain water; and if the arguments which at first sight seem strong in favor of allowing such a drink are unsound, still nothing can be alleged against the practice. The drink is agreeable to the palate, and cannot do any harm. During the whole of this stage the recumbent posture is strictly to be maintained; the patient being even lifted on a sheet and blanket into the bath, if one be given. With regard to medicines I think it may be fairly said that the chances of recovery are probably lessened by their use; while astringents, opiates, and alcoholic drinks prove injurious. This latter point seems to me to have been proved over and over again; though the evidence in favor of the opposite plan—of emetics and purgatives and bleeding—is of a very contradictory character. When cholera broke out in the 26th Regiment at the Indian town of Mhow, on December 15th, 1820, the first seventeen cases were treated with large doses of calomel, laudanum, stimulants, hot broths, &c., and only four recovered. Mr. Thompson then began, on December 18th, to use antimonial emetics, with purgatives of calomel and jalap, castor oil and senna; the six patients so managed all getting well.* By way of contrast, the following table, showing the results of treatment at the London Hospital in 1866, has been compiled:†

Treatment of 174 *Cases in Stage of Collapse.*

Remedies.	No. of Cases.	Died.	Living.
Mixture of logwood, ether, sulphuric acid, capsicum, and camphor,	48	31	17
Sugared water (Mistura Rubra),	56	28	28
Castor oil,	21	14	7
Saline lemonade,	20	6	14
Antimony with sulphate of magnesia,	2	2	0
Quinine and iron in solution,	3	1	2
Lead, camphor, opium, and creasote in pill,	9	4	5
Alcoholic saline injections into the veins,	15	11	4

Fourthly, the management of the consecutive fever must be conducted with caution. The patient is to be kept quiet and supplied freely with lemonade, black tea, mutton broth, &c. Where there is a tendency to stupor with flushing of the face, sinapisms to the nape of the neck, cold to the head, with an ordinary dose or two of gray powder and ipecacuanha can be recommended. Sometimes, under these circumstances, a small bleeding will afford much relief to the cerebral congestion. Supposing sickness to be troublesome, small lumps of ice, or cherry-water ices may

* Observations on some of the most important points connected with the Consideration and Treatment of Cholera Asphyxia. By James Hutchinson, A.M., Surgeon on the Bengal Establishment, &c., p. 124. London, 1832.

† Clinical Lectures and Reports by the Staff of the London Hospital. Vol. iii, pp. 444, 465. London, 1866.

be given, with simple effervescing draughts. When capillary engorgement of the lungs seems to be a source of danger, turpentine stupes to the back and front of the chest, with the administration of chlorate of potash, form the most hopeful remedies. If there be suppression of urine, dry cupping over the loins, repeated frictions with a mixture of equal parts of the belladonna and chloroform and soap liniments, and a few doses of benzoate of ammonia, had better be tried. The warm bath also does good in these instances; especially if followed by small doses of quinine and steel. Where the kidneys are acting naturally and exhaustion is the prominent symptom, stimulants may be given; the best consisting undoubtedly of the aromatic spirits of ammonia with some spirit of chloroform or ether. The greatest caution will be required in all instances, for a few days, with regard to diet; not a few deaths having occurred from the too early use of animal food. As a rule, broths and farinaceous substances only should be allowed, without any solids whatever, until the renal and biliary secretions have been fully re-established, and all the symptoms have vanished.

XVII. COLIC.

Colic [*Κῶλον* = the large intestine] is characterized by severe twisting pain in the belly, especially about the umbilicus, occurring in paroxysms. There is no inflammatory action in simple colic, and the pain is relieved by pressure. The disorder is accompanied by constipation, and often by vomiting; there is no fever, and no quickness of pulse; neither do we find any depressing anxiety as in enteritis, although the pain may be as severe.

Attacks of colic often arise from indigestion accompanied with flatulence; the suffering being severe until vomiting or eructation, or expulsion of the wind by the anus gives relief. A second common cause is the presence in the bowel of morbid secretions, or of retained excrementitious matters; easily cured by hot brandy and water, and a dose or two of castor oil. Then we from time to time have to treat nervous or spasmodic colic, such as occurs from fright, cold, hysteria, gout, &c.; and which demands the use of antispasmodics, like ether, chloroform, belladonna, and opium. Lastly, we may have colic from the slow cumulative action of mineral poisons, such as copper, lead, &c.

Flatulent colic, or that which arises from the undue accumulation of air in the stomach or intestines, is attended with pain, depression, and coldness of the surface. The air is generally derived from the decomposition of the food and glandular secretions; while there is every probability that, in certain states of the system, gaseous exhalations can take place from the mucous membranes. Air swallowed with the food may be a cause of excessive flatulence; examples of which are often seen in infants when they have been fed from a bottle by a careless nurse.

Flatulence [from *Flo* = to blow up] may exist as an idiopathic disorder, or it may be symptomatic of some other affection. In the first case, the flatus is usually most abundant when the patient has been fasting, and its presence is unaccompanied by any marked derangement of the general health. Nervous and hypochondriacal women who partake freely of tea are liable to it; or it can be produced by the use of any food which is liable to undergo fermentation. There is generally a want of tone about the sys-

tem, and especially a relaxed condition of the muscular fibres of the intestinal walls. In the second place, the flatulence is an attendant upon indigestion, inflammatory disorders of the stomach or bowels, organic disease of the liver, peritonitis, pelvic cellulitis, typhoid fever, uterine or ovarian irritation, gout, &c.

Idiopathic flatulence is generally to be cured by the avoidance of vegetable food and tea and beer; by the use of tonics, especially the mineral acids with strychnia or nux vomica (F. 376, 378); and by the exhibition of creasote (F. 41), or vegetable charcoal (F. 98). In tympanites from intestinal atony and weakness of the abdominal muscles, electricity is very useful; it being sufficient to apply both electrodes on different points of the abdominal parietes, and not to place the positive electrode in the mouth and the negative in the rectum, as advised by Becquerel. Supposing the distress proves so urgent that immediate relief is demanded, a draught containing spirit of chloroform or ether, carbonate of magnesia, &c. (F. 62, 85, 86), will be found most efficient; while a turpentine stupe had better be applied over the belly. The symptomatic variety of flatulence will have to be treated in various ways according to its cause. Conditionally that their employment is not forbidden by the nature of the existing disease, enemata of turpentine, assafœtida, and rue (F. 189) will be useful; while when the quantity of air is excessive its escape may be facilitated by passing the tube of the stomach-pump for several inches up the rectum.

In *copper colic* the pain often comes on very suddenly, and is aggravated by pressure; the distress being most severe at the pit of the stomach, or lower down—just above the umbilicus. The paroxysms are often of short duration; though they may possibly last for twenty-four or thirty-six hours. The bowels for the most part act regularly; there will generally be nausea and vomiting. The complexion is of a peculiar sallow hue, the countenance is anxious, the eyes appear sunken and the lips livid, while around the gums is a purple line, which is characteristic of copper-poisoning. Sometimes there are attacks of dyspnœa from laryngeal and bronchial spasm, possibly due to the inhalation of minute particles of copper. This disease is not frequently met with. The sufferers are coppersmiths, but principally and most severely the workers in copper at ship-building yards, &c. According to Dr. Maisonneuve no injurious results are produced by the working of cold metallic copper. The ill effects are observed when the fused metal is poured into moulds, or in workshops where molecules of oxide and carbonate of copper float largely in the air, whence they get introdueed into the air-passages and alimentary canal.

The management of these cases is simple. Attempts ought to be made to eliminate the poison from the system by purgatives; while the patient is to be relieved at the time by hot baths, sulphur baths, turpentine stupes, or sinapisms, and the administration of ether with opium. The men often treat themselves, milk in large quantities being a favorite remedy. Efficient ventilation of the workrooms, and habits of temperance, must be enforced.

Lead colic—or *Colica Pictonum*, so called from its former frequency among the Pictones or inhabitants of Poictou—has superadded to many of the symptoms already mentioned an intense grinding or twisting sensation around the navel, with retraction of the abdominal integuments towards the spine. There is usually pain in the back. The existence of a blue or slate-gray line around the edges of the gums is a pathognomonic symptom of the presence of lead in the system (p. 379). Painters most frequently

suffer from lead colic in this country; they often have several attacks before the muscles of the arms become affected with paralysis, causing *drop wrist*. Sleeping in a recently painted room, drinking fluids which have been kept in leaden vessels, taking snuff adulterated with lead, &c., are not unfrequent causes of this affection.

In the treatment of lead colic, our first object must be to get the bowels to act. This is usually accomplished with difficulty; but it will generally be best effected by administering from three to five grains of the resin of jalap, followed after some hours by full doses of sulphate of magnesia (F. 141). Two or three hours subsequently the patient may be placed in a warm bath, and part of the water injected into the bowels. Should these means fail, an ounce of castor oil must be given; or two or three doses of sulphate of magnesia with sulphuric acid (F. 142). Opium and belladonna will afterwards be necessary to remove all the pain; only farinaceous food ought to be allowed; and the purging should be kept up for a few days by the sulphate of magnesia, administered every morning. As a principle, it is as well not to give calomel in these cases; since it possesses no advantage over simple remedies, and it might happen that the symptoms of the disease would be attributed to the effect of the mercurial. Under no circumstances, however, is calomel admissible save as a purgative; for surely no physician ought to give one mineral poison to a patient who is already suffering from the effects of another.

The application of electricity by induction—faradization—is sometimes an excellent palliative, affording relief to the pain more speedily than any other remedy. If the practitioner be afraid of the electricity at first intensifying the suffering, the patient can be put under the influence of chloroform. When the attack has been relieved, and the bowels have been freely acted upon, the iodide of potassium should be administered (F. 31), while a hot sulphur bath (F. 125) had also better be ordered. Benefit will be derived from frequently repeating the latter.

XVIII. CONSTIPATION.

Constipation [*Constipo* = to crowd thickly together] is apt to arise during the progress of many acute or chronic diseases, or it may happen as an idiopathic affection. In either case, too much importance is usually attached to its occurrence, and consequently it is often treated with unnecessary activity.

The alvine evacuations, in a properly fed man, amount to 4 or 5 oz. daily (91 lbs. to 114 lbs. in the year). There is some variation in different individuals with regard to the frequency with which the bowels act during health. As a rule, most people have an evacuation every day, but some persons habitually go to stool twice in the twenty-four hours, while others only have an operation every second or third day. The most important consequences which result from habitual costiveness (by which term is meant, a departure from the standard natural to each individual) are irritation of the gastro-intestinal mucous membrane, and perhaps the reabsorption of excrementitious matters. The functions of the stomach, liver, pancreas, intestinal glands, &c., become imperfectly performed. Hence complaint is made of a sense of oppression, mental and bodily; the intellectual faculties are dulled, the complexion gets sallow and pasty, the skin is harsh

and dry, the urine is scanty and usually loaded with urates, while such motions as come away are pale and clay-like and very offensive. In obstinate cases the sufferer will possibly lose all power for exertion, he may have frequent attacks of wearisome headache, and dispiriting fits of palpitation of the heart are not uncommon, while more or less severe paroxysms of neuralgia torment him, and he gets hypped or even becomes a confirmed hypochondriac.

The causes of constipation are numerous. It may arise from structural disease of the intestinal coats, *e. g.*, tumor, cancer, and the contraction of cicatrices; or from some painful affection of the rectum, such as hæmorrhoids and fissure of the anus; or from debility of the abdominal walls, so that the parietal muscles cease to contract firmly, and thus fail to assist the peristaltic movements of the intestines; or from disease of the nervous system; or from the secretions of the liver or pancreas or intestinal glands becoming disordered or merely deficient in quantity. But of all causes the most frequent is a torpid condition of the colon, leading to insufficient contraction of this gut with the accumulation of fecal matter. This occurs in old people, in individuals weakened by exhausting disease, in chlorotic females, in the votaries of fashion accustomed to indolent and luxurious habits, in those who neglect to attend to the calls of nature, as well as in such as are engaged in sedentary occupations. In addition to constipation there is defective appetite, slow digestion, a pale sodden tongue indented at its edges, flatulence, fetid breath, a dingy complexion with dark lines under the eyelids and low spirits. When there is an accumulation of fæces the masses may be felt through the abdominal parietes, unless these walls are loaded with fat. Large collections sometimes take place about the cæcum, in the sigmoid flexure of the colon and in the rectum. Sometimes the quantity of retained fecal matter gets so excessive that a large abdominal tumor is formed, which will perhaps give rise to jaundice by its pressure on the biliary duct, or to œdema by impeding the flow of blood through the inferior vena cava. Cases have been observed in which the abdomen has been enormously distended, where a motion has not been passed for ten or twelve weeks, and where the contents of the rectum have had to be scooped away to procure room for the use of enemata. Now and then we hear it urged that an accumulation cannot have taken place, because the patient is tormented with tenesmus, and (as he persists in believing) with diarrhœa. The fact is, however, that when the descending colon and rectum become blocked up small quantities of fecal matter may flow through a channel formed in the mass, or they may pass between the substance and the walls of the bowel, and so lead to deception. I have seen several such cases occurring in delicate females during the period of pregnancy.

In attempting to cure habitual costiveness, the grand aim of the practitioner must be to do away with the use of purgative drugs. This cannot usually be effected at one rude blow, although it is possible at once to substitute simple aperients for the various patent medicines, the mischievous blue pills, and the nauseous black draughts with which the public are so fond of tormenting themselves. The remedies that may for a time be employed, at properly regulated intervals, are castor oil, olive oil, rhubarb, and magnesia (the officinal compound rhubarb powder), syrup of senna, sulphate of soda (F. 144, 148), purified ox-bile (F. 170), nitric acid, and taraxacum (F. 147), Seidlitz powders (F. 169), glycerin, resin of podophyllum with rhubarb or ipecacuanha (F. 30, 160), &c. Small doses of the extract of Barbadoes aloes are often of great service; from half a grain to three grains in a pill at dinner, producing a comfortable action in from six to twelve hours. The dose found to be sufficient to insure one stool daily

should be persevered with just as long as is deemed necessary, and then gradually diminished. The effect of the aloes is increased by combining it with the extract of nux vomica, with sulphate of zinc, and with pepsin. On the contrary, the aperient action is lessened by administering it with reduced iron and quinine, or with sulphate of iron. An imitation of the Cheltenham or Carlsbad waters (F. 180, 181) will often prove useful. So, too, simple electuaries (F. 194) may be tried, or five or ten grains of liquid tar formed into pills, and taken every night at bedtime for some weeks, sometimes succeed; or frequently it will be much better if the patient can be persuaded to trust to enemata of soapy water, of salt and barley-water, or of castor oil (F. 188, 189, 190). A suppository made with sixty or eighty grains of cocoa butter, or the same quantity of soap, can be easily introduced into the rectum, and will generally act quickly. To restore tone to the colon, tonics are invaluable and hence many of the prescriptions just recommended contain these agents in combination with the purgatives. But after ten or fourteen days the aperient medicines had better be gradually discontinued and tonics alone trusted to; the best drugs of the latter nature being quinine and steel and strychnia (F. 380), quinine and rhubarb and hop (F. 385), sulphate of zinc and nux vomica (F. 409), strychnia and nitro-hydrochloric acid (F. 378), valerianate of zinc and belladonna (F. 410), different preparations of pepsin (F. 420), and cod-liver oil (F. 389). With nervous cases a mixture containing the hypophosphite of soda or lime (F. 419), or a solution of phosphorus in cod-liver oil (F. 417), taken twice or thrice daily, often acts advantageously, while in those examples of chronic disease attended with suffering, where opium is needed, the constipating effect of this drug may generally be obviated by combining the extract of belladonna with it (F. 340, 344).

None of the foregoing remedies will prove of permanent service unless attention be paid to the diet. It is of the greatest importance that the food be wholesome and digestible; a variety of dishes being only injurious when they lead the patient to eat to excess. Vegetables are often objectionable, more especially if they produce flatulence; while the necessity for them, until the function of digestion is healthily performed, can often be obviated by the use of ripe fruits in the morning. When the latter fail, figs or prunes soaked in olive oil will perhaps succeed. Oatmeal porridge for breakfast is regarded as a specific by some patients; while others look to their pipe or cigar for affording the necessary provocative. Brown bread, that containing the bran, can often be substituted for the fine bread usually consumed; but for the stomach to be able to utilize that outer covering of the wheat, rich in gluten and fatty matter, it must be strong enough to digest it properly. The aerated loaf is generally to be preferred either to brown or the common white bread, since it is certainly more easily assimilated.

Daily exercise in the open air, either on foot or on horseback, stands foremost amongst the remedies for constipation. General indolence, with too much sleep, must be avoided. There are very few cases of costiveness with dyspepsia, arising from sedentary pursuits, that may not be cured by the sufferer retiring to bed at eleven o'clock, and drinking a tumblerful of spring-water; rising at seven in the morning and taking a bottle of soda-water, then walking for three-quarters of an hour, and afterwards breakfasting upon weak tea with plenty of milk, fat bacon or cold meat, bread, &c. In the hepatic sluggishness of old age, nothing is more beneficial than a daily walk, or even than a ride in an open carriage.

There are, in conclusion, two or three suggestions which may be advantageously remembered. Thus, it is very necessary that the different meals

should not be hurried, it being important to masticate the food thoroughly. Where the teeth are unsound or deficient, they ought to be replaced by well-made artificial ones. The bowels can be advantageously solicited to act at a regular hour every day, soon after breakfast being perhaps the best time. A tepid salt-water sponge or shower-bath every morning, followed by friction with coarse towels, gives tone to the alimentary canal. In some instances, where the liver is congested or the secretion of intestinal mucus deficient, marked benefit arises from wearing the "wet compress" at night; this application merely consisting of two or three folds of thin flannel or calico, wrung out in cold water, laid upon the abdomen, and covered with gutta-percha or a piece of impermeable cloth. When the abdominal muscles are weak and flabby, and the peristaltic action of the contractile fibre-cells of the intestinal walls is deficient, galvanism proves of great utility. And lastly, in the cases especially of children and old people, gentle kneading of the abdominal muscles, or friction with some stimulating liniment, will often produce a daily evacuation without any discomfort.

XIX. OBSTRUCTION OF THE BOWELS.

Intestinal obstruction is a fearful disorder, which may arise from several conditions. The chief of these are stricture, intussusception, and internal strangulation. Pathologists who like learned words speak of obstruction with fecal vomiting as *Ileus* [*Εἰλέω* = I twist or contract]; while the disease is also known as the *Ileac passion*, *Volvulus*, and *Colique de Miséricorde*. The most frequent cause, perhaps, of an obstruction to the passage of the fæces through a part of the intestinal tube, is strangulated hernia; and consequently, in every case of obstinate constipation the practitioner should make a careful examination of those parts of the abdomen, thigh, and hip, and (in woman) of the vagina, at which the intestines may protrude.

Pathology, &c.—Dr. Haven has collected, from various sources the histories of 258 cases of intestinal obstruction; which, without including examples of inguinal and femoral and umbilical hernia, he has thus tabulated:*

Three divisions of the causes of intestinal obstruction are made, viz.:

1. *Intermural*, or those originating in and implicating the mucous and muscular coats of the intestinal walls:
   - *a.* Cancerous stricture.
   - *b.* Non-cancerous stricture, comprising—
     1. Contractions of cicatrices following ulceration.
     2. Contractions of walls of intestine from inflammation, non-cancerous deposit, or injury.
   - *c.* Intussusception.
   - *d.* Intussusception associated with polypi.

* American Journal of the Medical Sciences, vol. lvi. Philadelphia, 1855.

2. *Extramural*, or those causes acting from without, or affecting the serous covering:

   a. Bands and adhesions from effusion of lymph.
   b. Twists or displacements.
   c. Diverticula.
   d. External tumors or abscesses.
   e. Mesocolic and mesenteric hernia.
   f. Diaphragmatic hernia.
   g. Omental hernia.
   h. Obturator hernia.

3. *Intramural*, or obstructions produced by the lodgment of foreign substances:

   a. Foreign bodies, hardened fæces, concretions having for nuclei gall-stones, &c.

In the first class, the large intestines is affected more than twice as frequently as the small: in the second class, the reverse happens. The average duration of the attack of obstruction is shorter in the first class than in the second: on the whole, the average is about three weeks. Sir Astley Cooper mentions three other causes of obstruction, viz., hernia at the ischiatic notch, at the foramen Winslowii, and perineal hernia; but none of these causes existed in either of the 258 reported cases.

In 169 examples of intestinal obstruction collected by Mr. Phillips*—63 were instances of invagination or intussusception; 60 of strangulation by the constriction of bands, adhesions, and abnormal openings; 19 were caused by disease of the coats of the bowel; 11 by impaction of hardened fæces, or concretions; and 16 were owing to the pressure of tumors external to the bowel.

When the strangulation is due to *bands* or *twists*, the lower part of the ileum is the most frequent seat of the mischief. There may be only one band, and it may have various attachments in different cases. Most commonly, perhaps, it is connected by one or both ends with the mesentery. In some rare instances a portion of bowel has slipped down into the pelvis in front of the pedicle of an ovarian tumor, and has become fatally strangulated.

In *Intussusception* (that condition where one part of the bowel is drawn into another portion, just as the finger of a glove can be made to glide within itself) the passage of the gut gets more or less obstructed by the congestion, effusion, and inflammation which result. Most frequently the intussusception is single, though three or four or even ten distinct invaginations have been found in the same subject. The traction is usually from above downwards,—that is to say, the upper segment of the bowel is drawn into the lower. Probably in half the cases, the ileum and cæcum are protruded into the colon. This kind of obstruction is most common in young children and in old age;† while in addition to the sickness, constipation, tenesmus, sudden violent pain, &c., there is often a discharge of blood and mucus per anum. Spontaneous reduction of the invagination may take place; but when it does not happen, inflammation of the peritoneal coats

* Medico-Chirurgical Transactions, vol. xxxi, p. 3. London, 1848.

† The deaths from Intussusception in England during the year 1866 were $\frac{\text{Males } 146}{\text{Females } 149}$ = 295. Of these, 70 occurred in children under five years of age; and 111 in individuals beyond the age of 55.

of the involved portion of the bowel usually sets in between the third and seventh days, the opposed surfaces probably becoming adherent in from five to eight days after the commencement of the peritonitis. Where the intussusception does not cause complete obstruction, weeks may elapse without any inflammation occurring. In a considerable number of instances the inflammatory action ends in gangrene, and many inches of the included sphacelated bowel have come away by the rectum, leaving the canal of the gut free; so that a cure will often ensue if care be taken not to disturb the adhesions. From the discovery of intussusception in the dead body it must not always be inferred that this displacement existed during life. Where no symptoms of this state have been presented before death it is probable that the occurrence has happened subsequently from contraction of the muscular tissue during the rigor mortis.

Intestinal concretions (alvine calculi) are very rarely found in the human intestines, compared with their frequency in large ruminating animals. In man, they are more common in the cæcum and colon than in other portions of the alimentary canal. *Bezoars* consist chiefly of imperfectly crystallized earthy salts and indigestible fibrous matters, arranged in concentric layers round a nucleus—a gallstone or any foreign body. Other concretions may consist solely of hardened fæces, with the phosphates of lime and magnesia; or of chalk or carbonate of magnesia, where these substances have been largely taken; or of hair, cotton, or paper when a depraved appetite has led to the consumption of either; or of gallstones with layers of inspissated mucus and fecal matter. Either kind may gradually increase in size, until there is complete obstruction of the gut. In fortunate cases, concretions have been expelled by vomiting or passed at stool. When situated in the rectum they can be removed by the scoop. If one or more can be felt through the abdominal parietes, producing obstruction, an incision into the intestine has been recommended, all other plans failing. I am not aware that such an operation has been performed.

With regard to *cancerous stricture*, the sigmoid flexure of the colon and the rectum are the parts usually affected. The walls of the bowel need not be infiltrated with cancer in their entire circumference. There is a history of previous suffering. There have been discharges of blood and mucus from the bowels; whilst the fæces have been small and flattened, or reduced to the size of the stem of a tobacco-pipe. Moreover, the general symptoms of malignant disease are superadded to the signs of occlusion of the intestinal tube.

Symptoms.—The principal symptoms of obstruction of the bowels are constant vomiting, which is at first simple, consisting of the contents of the stomach and mucus, but which in a few days becomes stercoraceous, or fecal; pain varying in degree, often very severe; gradually increasing tympanites, with violent borborygmi, unless the occlusion be high up; severe hiccup, particularly in strangulation of the upper part of the small intestine; great mental depression; and the pathognomonic symptom—constipation. Very careful palpation will often detect, at an early period, a feeling of increased fulness just above the obstruction. Percussion elicits diminished resonance, more marked at the point at which the intestinal transit is blocked than elsewhere. In almost all instances, the prostration sets in early. Acute peritonitis very commonly occurs in a few days; while gangrene is most frequent in intussusception and obturator hernia. The lower the obstruction is situated the less urgent will be the vomiting. If, for instance, it is in the duodenum, the vomiting will be incessant from the beginning; if in the colon, it may be absent for some time. It might be thought that the ileo-cæcal valve would prevent the return of the contents

of the colon into the ileum: the preliminary dilatation, however, renders this valve quite patulous. When urine is freely secreted, the obstruction cannot be very high up, since absorption is only partially checked. The urine, however, may be scanty when the seat of occlusion is low down, if there be copious vomitings of fluids; or if there be much fever present.

From the time of Galen, the occurrence of fecal vomiting has been explained on the supposition that it was effected by an antiperistaltic movement of the intestinal canal. Dr. Brinton, however, has shown conclusively that the natural peristaltic action of the bowel above the occluded point is not reversed; but that the intestinal contents are gradually propelled until stopped at the obstructed point. Here they accumulate so as to distend the canal with a liquid mass; and then a double current is formed, one at the surface or periphery of the tube having the direction of the peristalsis itself, and one in its centre or axis having exactly the reverse course.

When the obstruction is in the upper tract of the small intestine, and our treatment fails to remove it, death usually occurs from collapse in a period varying from five to ten days; while occlusion of the colon, from being attended with less pain and distress, and from not interfering so much with the absorption of nutriment, may only prove fatal after several weeks. Moreover, it must be remembered that in cases apparently hopeless, a spontaneous cure sometimes takes place almost at the last moment; so that the more protracted the duration of the disease, the greater the chance of recovery.

Treatment.—In the management of cases of obstruction of the bowels there must be at first a period when the diagnosis can only be doubtful. At this early stage, purgatives will certainly be resorted to, though they need never be of a violent or drastic nature. An ounce of castor oil may be given, or two or three grains of resin of jalap, or ten grains of the pill of colocynth and hyoscyamus; though preferably an enema (F. 189, 190, 191) should be tried, the patient being directed to retain it for an hour or two, if possible. But directly the practitioner is convinced that there is some mechanical obstruction to the passage of the stools, all remedies of this class ought to be strictly withheld, since they are positively mischievous.

Under these circumstances, the increase in the severity of the symptoms is to be retarded by attention to the nourishment of the patient, and by alleviating pain. As regards the first point, it is certain that the more freely food and fluids are partaken of, the greater will be the distension and torment and danger. It is absolutely necessary, therefore, that the sufferer exercises great self-denial; and that instead of attempting to quench his thirst with copious draughts, he be content to alleviate it by sucking ice and frozen milk, as well as by frequently washing out his mouth with cold water. To support the strength, small quantities of extract of beef, or soup, thickened with flour and eggs (F. 1, 2, 3, 5), had better be given; a little tea with cream is often refreshing; while iced brandy and water will form the best stimulant. If the vomiting be severe, food by the mouth must be stopped, and nutrient enemata (F. 21) trusted to. The second indication is to be carried out by a recourse to sedatives. When the suffering is not acute, I generally trust to the administration of belladonna and hyoscyamus (gr. $\frac{1}{4}$ of the first to gr. 5 of the last); repeating this pill every three or four or six hours, according to the urgency of the symptoms, and the way in which the drugs are tolerated. But there are more severe cases where stronger remedies are needed, and then opium is to be administered. This medicine frequently proves invaluable, under these circumstances; inasmuch as it relieves or removes pain, checks spasm and contraction,

diminishes the peristaltic action of the bowels, and supports life by lessening waste of tissue. Large quantities will usually be needed; while no preparation is better than the officinal extract, given at first in grain doses every four, six, or eight hours. If preferred, however, the subcutaneous injection of morphia and atropin (F. 314) can be tried instead of exhibiting the opium by the mouth. Relief will also be afforded by the free application of belladonna mixed with extract of poppies (F. 297) over the abdomen, together with the assiduous employment of large hot poultices or fomentations.

But it may fairly be inquired, are there no direct means which can be tried in order to overcome the obstruction? There are two: a surgical operation; and the injection of large quantities of fluid into the bowel, with manipulation of the intestines by pressure upon them through the abdominal walls. As regards gastrotomy, the want of success which has attended this operation has been so universal, that many excellent surgeons now consider it unjustifiable. For they argue, that while on the one hand this proceeding has almost always proved fatal, on the other, many desperate cases which have been let alone have ended favorably; recovery setting in just as all hope was being abandoned. Allowing the great force of these objections, it still seems to me that there are a few—possibly quite exceptional—instances where surgical interference may be the means of prolonging life, when all else seems to have failed. Thus, if we can be certain that the occlusion is due to malignant disease or to some tumor in the sigmoid flexure of the colon or rectum, then by opening the colon in the left loin (Amussat's operation) and forming an artificial anus, the surgeon may be the means of relieving much suffering and lengthening life. So also in cases where the obstacle is in the transverse portion of the colon, a similar proceeding can be resorted to in the right loin. Again, if by a careful and searching examination we come to the conclusion that the obstruction is in the small intestine, and is caused by a diverticulum, or by a constricting band of organized lymph round the bowel, it is the duty of the practitioner to perform gastrotomy. On the contrary, in the case of intramural obstructions, of intussusception, of stricture from the contraction of cicatrices, of obstruction complicated with enteritis or peritonitis, of obstruction from cancer of the small intestine, in neither of these instances has any operation the least chance of success.

The use of large enemata, with manipulation, remains to be mentioned. And first it must be remarked, that though this proceeding is here spoken of at the end of this section, it is really to be practiced at a very early stage, and certainly before there is any fear that the tissues have become gangrenous. Supposing that ordinary injections into the rectum have failed in their object, the patient should be placed on his back, with the pelvis considerably elevated while the shoulders are depressed. A long stomach-pump tube is then to be carefully passed as high as it will go; the anus is to be compressed around the tube by pressure with the hand and napkins, and warm water is to be slowly injected, as much as possible being thrown up until there is distension of the bowel. As the fluid is allowed to come away the surgeon is to press with the flat of his hands upon the abdomen so as to move the coils of the intestine upon one another, and to press them upwards against the diaphragm. This proceeding may be adopted more than once; and in many cases it will be advantageous to have the patient under the influence of chloroform while practicing it. Inflation of the bowel is a hopeful proceeding in the intussusception of children. The air should be slowly injected, until the abdomen is greatly distended; while

stimulants ought to be at hand, since the proceeding is apt to give rise to syncope.

Inasmuch as I should never resort to the use of crude mercury in doses of one or two pounds, or of small shot, or of strong tobacco injections, these agents need not be noticed, except to mention that they have each been recommended.

XX. INTESTINAL WORMS.

Helminthology [from *Ἕλμινς* = a worm + *λόγος* = a discourse] or the science which treats of the internal parasites of man and animals, has of late years attracted considerable attention. The number of these different parasites met with in the human subject is rather large (at least thirty-one), for there is scarcely a tissue or organ in the body in which they are not known to lodge and nourish themselves. The classification of the helmintha into those inhabiting the intestinal canal and those residing in other organs is only to be sanctioned on the ground of convenience; for scientifically such a division is imperfect.

There are seven principal entozoa [*Ἐντὸς* = within + *ζῶον* = an animal] occasionally found inhabiting the human intestinal canal. Of these, four possess an alimentary tube, and are therefore called hollow worms, or *Cœlelmintha* [*Κοῖλος* = hollow + *ἕλμινς*]; while there are three which have no abdominal cavity, and are hence termed solid worms, or *Sterelmintha* [*Στερεὸς* = *ἕλμινς*].

In the first class we have the following:

1. The *Trichocephalus dispar*, or long thread-worm, is a small nematode [*Νῆμα* = a thread + *εἶδος* = form] helminth, usually found in the cæcum and large intestines. It measures from an inch and a half to two inches in length, and has a very slender body. This parasite is said to be often present in considerable numbers, even in the intestines of healthy persons; and certainly it must be very prevalent in some localities, if M. Davaine's calculation is correct, that half of the inhabitants of Paris are infested by it. During life these worms give rise to no special symptoms.

2. The *Ascaris lumbricoides*, or large round-worm, is found in the small intestines, especially of ill-fed children. This nematode helminth somewhat resembles in size and appearance the common earth-worm. It varies in length from six to twelve or fourteen inches, is of a light yellow color, and is unisexual. The female is larger than the male. Although the habitat of this worm is the small intestines, yet it may migrate upwards into the stomach or downwards into the colon; and consequently be vomited in the one case, or evacuated with the stools in the other. Sometimes these worms are very numerous: thus Dr. Hooper has recorded an extraordinary instance in which a girl passed more than two hundred in one week. The symptoms which they give rise to are usually obscure; but there may be thirst, disturbed sleep with grinding of the teeth, moroseness with low spirits, pallid countenance, fetid breath, swelled belly, emaciated extremities, depraved appetite, slimy stools, itching of the nose, tenesmus, and irritation of the anus.

3. The *Oxyuris vermicularis*, or small thread-worm, is found in the rectum, about the sigmoid flexure of the colon, and even in the cæcum and lower end of the ileum. It is the smallest of the intestinal worms, averaging usually about a quarter of an inch in length, while the female is longer

than the male. This nematode worm is very frequently met with in children, and is permanently got rid of with great difficulty. It is very rarely found solitary, being generally present in groups or masses. The symptoms produced by these oxyurides are chiefly, intolerable itching and irritation about the anus, tenesmus, depraved appetite, picking of the nose, offensive breath, and disturbed sleep. Exceptionally, more serious results ensue; such as convulsions, chorea, epileptiform attacks, and irritation of the sexual organs leading to other evils.

4. The *Sclerostoma duodenale*, a small nematode worm about the third of an inch long, is unknown in this country. As shown in the remarks on diseases of the duodenum, this entozoon is very common in Egypt, its presence in the small intestines of the natives giving rise to severe anæmia. The people of Northern Italy also suffer from it.*

In the second class we find three species:

1. The *Tænia solium*, or common tapeworm of this country, belongs to the cestode [*Κεστός* = a girdle + *εἶδος*] group of helminths. It may occur singly, or there will be some three or four tæniæ. This parasite consists of a number of separate joints, called proglottides. It exists in the small intestines; while it varies in length from five to fifteen yards, and in breadth from two lines at its narrowest part to four or five at its central or broadest portion. The head of this parasite (or perhaps more properly, its root) is small and flattened; having in its centre a projecting papilla, armed with a double circle of hooks, around which are four suckers or mouths by which the worm attaches itself to the mucous coat of the bowel. The generative apparatus consists of a ramified canal or ovarium containing the ova, and of a minute spermatic duct, both occupying the centre of each joint or segment. This worm is probably nourished by imbibition through its tissues, just as algæ imbibe nourishment from the sea-water in which they float. The researches of Küchenmeister have shown that the Tænia solium is the same parasite as the Cysticercus cellulosæ (pork-measle) of the pig, though in a larval or scolex condition. The symptoms which arise from the presence of the tapeworm are not very striking, its existence being generally unsuspected until single joints are passed in the stools. In certain cases, however, there is a continual craving for food, debility, pain in the stomach, irritability of the bladder, vertigo, noises in the ears, attacks of faintness, restlessness, emaciation, and itching about the nose and anus.

2. The *Tænia mediocanellata* is a cestode worm, with its segments somewhat larger than those of the common tapeworm. It differs from the latter also in other respects, but particularly as regards its head; which, although furnished with large sucking-disks, is destitute of any hook apparatus—is unarmed. The "measles" or cysticerci which produce this helminth are found in the muscles of cattle. According to Dr. Cobbold the hookless tapeworm is as common in this country as the Tænia solium, for which it is generally mistaken. "One may even go so far as to state that, admitting occasional exceptions, the hooked worm infests the poor, and the hookless worm the rich. This circumstance accords with the fact that the lower

* The *Distoma crassum* and the *Distoma heterophyes* (small trematode helminths) have also been discovered in the small intestines. The first variety was once found by Mr Busk in the duodenum of a Lascar; the second kind was discovered by Dr. Bilharz, of Cairo, in two cases. Dr. Cobbold has also shown that the common *Ascaris mystax* of the cat may infest the human intestine. This nematode worm is especially characterized by the presence of alaform appendages, one being placed on either side of the head. The male acquires a length of about two inches and a half, whilst the female is nearly twice as long. The cases in which this helminth has been detected in man are only three or four in number.

classes subsist chiefly upon pork, whilst the wealthier prefer mutton, veal, and roast beef."*

3. The *Bothriocephalus latus*, or broad tapeworm, is almost peculiar to the inhabitants of Switzerland, Russia, and Poland. It is the largest cestode helminth ever met with in the human subject; sometimes, according to Dr. Cobbold, attaining a length of more than twenty-five feet, and a breadth of nearly an inch. The extreme fertility of the Bothriocephalus latus may be imagined by considering that each foot of the well-developed worm contains 150 segments or joints, each joint possessing its own ovary and male organs. Hence each joint is fertile; and as each ovary could produce 8000 ova, it may be calculated that ten feet of such a worm might create 12,000,000. These parasites are very rarely met with in this country, but nevertheless they are discovered occasionally. Professor Owen, examining the collection of a worm doctor in Long Acre, found three specimens: two had come from persons who had been in Switzerland, but of the third nothing was known.

Causes.—The eggs and larvæ of the entozoa gain admission into the stomach through the use of raw and underdone animal food, especially pork. They also get introduced with vegetable food,—probably with watercresses, celery, lettuce; possibly with fruit, such as apples and pears; and certainly with impure drinking-water. The eggs and embryos of the tænia solium, of the tænia mediocanellata, and of the tænia echinococcus, may often be found in pond and ditch and other stagnant waters.

Symptoms.—The most common symptoms produced by intestinal worms are: colicky pains and swelling of the abdomen; picking of the nose; itching of the rectum and fundament; pruritus of the perineum; foulness of the breath; irregularity of the bowels; attacks of headache; grinding of the teeth at night; pallor and slight puffiness of the face; a frequent feeling of malaise; and voracious or impaired appetite. The most conclusive sign is the passage of some of the worms, or of joints of them, in the fæces; and indeed without this, the other symptoms are of little value.

When intestinal worms produce much irritation, the nervous system may become affected by reflex action; and hence convulsions, or epileptic attacks, or fits of hysteria, are not unfrequently the result. So, also, there may be noises in the ears, giddiness, considerable anæmia, and even insanity. Küchenmeister mentions, without confirming the observation, that Dr. Ficinus of Stolberg regards habitual pains in the crown of the head as dependent upon tapeworm. He found this symptom almost always accompanied with this parasite, although only so in women.

Treatment.—We have several remedies for the round and tapeworms, such as the oil of turpentine (F. 183), santonin (F. 185), kousso (F. 184), kamela (F. 182), calomel with scammony or jalap (F. 159), and especially the liquid extract of male fern. I am in the habit of trusting to the latter; which may be employed in full doses even for children three or four years old, and which is to be thus administered. On the first morning the practitioner commences hostilities with a dose of castor oil, aloes, or a Seidlitz powder; while during the day he takes care to keep the patient on very low diet, only allowing a little good beef tea. At night the purgative is repeated, so that the worm or worms get thoroughly uncovered by the removal of the contents of the alimentary canal. Consequently they receive the full benefit of the (to them poisonous) dose of male fern, which is taken the first thing on the following morning, according to F. 187. By this

* Entozoa: an Introduction to the Study of Helminthology, with Reference more particularly to the Internal Parasites of Man, p. 243. London, 1864.

means, perhaps, once or twice repeated, there will seldom be any difficulty in removing the whole worm, including the head. To prevent the development of another worm tonics should be given, especially the mineral acids, with steel in infusion of quassia. The patients ought likewise to be directed to take plenty of salt with their food; and to have the latter well-cooked.

The oxyurides can generally be killed by enemata of cold water, or of infusion of quassia, or of steel and quassia (F. 192), or of a solution of common salt (F. 188), or of lime-water, or of fifteen minims of sulphuric ether in an ounce of water, or of the tincture of the perchloride of iron—in the proportion of half an ounce to half a pint of water for adults. Mercurial purgatives have seemed to me to act beneficially, while sometimes large quantities of the worms have come away after an attack of bilious diarrhœa. Nevertheless, it is often very difficut to effect a thorough cure in the case of patients tormented with the Oxyuris vermicularis; and the only chance of doing so is by persevering with the enema twice a week for several months, while some preparation of steel is also given by the mouth at mealtimes. The worms may be apparently quite destroyed, and for a time there will be a cessation of annoyance; but again and again they return, until the sufferers or their parents give up all treatment in disgust.

XXI. PERFORATION OF THE BOWEL.

The intestine may be perforated owing to disease in the coats of the bowel, or from the extension of ulceration affecting adjacent organs. The first class of cases has been already treated of; and it has been shown how perforation will possibly take place in fever, inflammation of the cæcum, dysentery, cancer of the stomach or bowel, &c. The second division remains to be briefly considered, viz., where the perforation occurs from without inwards.

Hydatid disease and *abscess of the liver* not unfrequently end by perforating the bowel; when hydatids or pus, as the case may be, will either be vomited or passed away in the stools. The symptoms of hepatic disease, the slow growth of hydatid tumors, the occurrence of local peritonitis, and the character of the discharge, will render the diagnosis of these cases comparatively easy. Then, in the same way, *abscesses of the spleen and kidney* may open into the bowel; although such events are of very rare occurrence.

Calculi from the gall-bladder sometimes enter the bowel by direct ulceration through the apposed coats of the reservoir for the bile and the duodenum. This has generally been the case in those instances where an impacted gall-stone has produced obstruction of the bowels, the concretion having originally been too large to pass down the cystic duct.

Ovarian cysts have often emptied themselves by a communication taking place between them and the cæcum, or colon, or rectum. The subsidence of the tumor, together with the passage of the cystic fluid per anum, will point to the true nature of this occurrence. Many examples of *extra-uterine fœtation* could be referred to, where the sac containing the fœtus has formed a communication with the cavity of the rectum. As the fœtus decomposes, its soft parts and bones are gradually voided with the stools; while with

care the mother will gradually recover.* Indeed, one or two rare instances are known in which extra-uterine pregnancy has twice occurred in the same woman, with the same favorable result. *Ovarian abscess*, as well as *abscess, the result of pelvic cellulitis*, may open into the rectum. In both instances, *fecal abscess* almost invariably results, owing to some portion of the contents of the bowel passing into the purulent cyst. The suppurative process is thus kept up: consequently these abscesses burrow in all directions, opening into the bladder, vagina, groin, and perhaps again into the rectum. The wife of a medical man was long under my care with such an abscess; there being at one time, three separate openings in the groin from which pus, urine, and liquid fæces used to be discharged. The practitioner may try to effect a cure with strengthening food, tonics, opiates for the mitigation of pain and diarrhœa, cod-liver oil, sea-air, rest, and carefully adapted pressure, but usually his efforts will fail. The patient either dies from hemorrhage, or she gradually sinks from exhaustion produced by the purulent discharges, the constant pain, and the general weariness.

In cancer of the uterus it is no very uncommon circumstance for the ulceration to extend through the uterine or vaginal walls into some portion of the bowel, which has previously become adherent to the diseased mass. In such cases, there is often also a fistulous communication with the bladder, so that the poor woman's sufferings are greatly increased by the constant escape of fæces and urine at the vaginal outlet. The rectum, vagina, and bladder become converted into a single cavity; with such distressing consequences as can be imagined. Fortunately such untoward events as these only occur during the last stage of malignant disease—towards the termination of life; since, beyond giving temporary ease by sedatives, nothing can be done to afford effectual relief.

Suppuration in the abdominal parietes, the consequence of inflammation excited by falls, blows, &c., often simulates deepseated disease. The abscess may open externally, or into the peritoneal cavity, or into some part of the intestinal canal. When the purulent collection tends towards the surface, the diagnosis is not difficult; but when the matter burrows among the muscles, and is confined beneath the fascia of the abdominal wall, the case is very likely to be mistaken for peritonitis, malignant disease of some internal organ, or for some affection of the cæcum, liver, kidney, spleen, &c. It is important that the true nature of the case should be detected as soon as possible; since all risk is avoided by making an early opening, and so permitting the contents of the abscess to be discharged externally.

XXII. DISEASES OF THE RECTUM.

The diseases of the terminal portion of the alimentary canal are numerous and important. They often give rise to serious bodily suffering. The sympathy between the uterus and rectum being great, it can hardly be doubted that disease of the latter is at times the cause of barrenness, as well as of symptoms which are erroneously referred to the uterus or ovaries. Affections of the rectum, in almost all instances, cause great mental depression. Indeed, like disorders of the sexual organs, they produce an amount of

* Compare with the Author's Signs and Diseases of Pregnancy. Second edition, p. 284. London, 1867.

anxiety greatly disproportionate to their gravity; for it is fortunate that most of them readily yield to well-devised treatment. Although the rectum is some six or eight inches in length, yet the greater number of its diseases may be said to be situated within two inches of the anus. Consequently, they are easily detected by a tactile or visual examination, while local remedies can be employed without difficulty.

1. RECTITIS, PROLAPSUS, STRICTURE, &c.—Unless due to violence, or to the presence of some foreign body, simple *inflammation of the rectum* is, I believe, a very uncommon affection. Where it occurs, the local and general suffering it gives rise to are considerable; though with a correct diagnosis, relief can soon be given. In former days, rectitis may have been more frequently met with; since drastic purges, large doses of aloes or calomel, and the abuse of intoxicating drinks, are very likely to provoke it. Moreover, the inflammatory process more rarely extends to the rectum from contiguous parts than might be expected; for during the past twenty years, I have very seldom met with such an occurrence, though a large number of severe ovarian, uterine, and vaginal diseases have come under my observation. The chief symptoms of rectitis are a sensation of intense heat around the anus, severe pain shooting up the sacrum and back, spasmodic contraction and excessive sensitiveness of the sphincter ani, tenesmus with the passage of dark-colored and gelatinous mucus, irritability of the bladder which urinating fails to relieve, and considerable constitutional disturbance. The principal remedies consist of rest in bed, a milk and farinaceous diet, sedative enemata (F. 339), and the repeated use of the hot hip-bath. Where there are dysenteric symptoms, a large dose of ipecacuanha (see p. 584) may be administered with the greatest benefit.

The *foreign bodies* met with in this portion of the bowel will be found to consist either of substances which have been swallowed, such as the stones of fruit, fish-bones, coins, &c.; of concretions formed in the intestines, having a gallstone, or some mass of indigestible matter as a nucleus; or of articles forced through the anus, such as pieces of wood, syringe-pipes, gallipots, bottles, ferrules, &c. The ingenuity of the practitioner will often be taxed in the extraction of these bodies; for he must be careful to act as gently as possible, remembering that all the coats of the rectum may be lacerated without great care. Indurated fæces are to be removed with a lithotomy scoop, or with the handle of a strong spoon, if syringing with warm soapy water will not cause their expulsion.

Irritable ulcer of the rectum, or *fissure of the anus*, is apparently a very slight affection, but it gives rise to the greatest suffering. The ulcer is generally superficial, about the eighth of an inch broad, and the third of an inch long; while it is seated immediately within the anus. It may often be exposed by spreading out the anal orifice with a hand over each buttock; but when it cannot be made visible in this manner, a speculum should be employed. The introduction of neither this instrument nor the finger can frequently be borne, however, without the use of chloroform, so intense is the pain which an examination produces. On this account also the ulcer is often a cause of constipation, the patient deferring the act of defecation through fear of the suffering. The fæces in their passage irritate the sore, and produce spasm of the sphincter ani; an acute burning pain resulting which may last for two or three hours after the bowels have acted.

The disease is more common in women than in men; while in the former it not unfrequently gives rise to ovarian or uterine pain, together with

irritability of the bladder. Moreover, it may produce such tenderness of the surrounding parts that sexual intercourse cannot be borne.

In attempting to heal the ulcer care must be taken to avoid fretting it by strong aperients, while at the same time the bowels must not be allowed to get confined. Small doses of castor oil, or of an electuary of senna and taraxacum (F. 194), may be beneficially ordered; or a dinner-pill containing pepsin and the watery extract of aloes (F. 155) is deserving of a fair trial. With regard to local applications I have found none so beneficial as a combination of mercurial ointment (oz. $\frac{1}{2}$) with belladonna (gr. 20); which may be best applied by forming it into sticks, the third of an inch in diameter and an inch and a half in length, with the oil of theobroma (cocoa butter). Astringent applications are seldom of any service; while I would especially caution the practitioner against the u e of the nitrate of silver. I have seen this caustic produce such intense suffering, lasting for hours, that I shall never again sanction its employment. The foregoing means failing to effect a cure a slight operation must be performed; which consists in making a longitudinal incision through the centre of the ulcer and the superficial fibres of the sphincter ani, so as to keep the part at rest while the healing process goes on. The bowels should be previously cleared out by a dose of castor oil; and immediately after the operation one or two grains of the extract of opium ought to be administered so as to induce constipation for about three days. An aperient may then be given; while for some time subsequently the motions had better be kept rather soft, a proceeding often best accomplished by the administration of cod-liver oil, with small doses of taraxacum. It only remains to add that if there be (as there often is) a little external pile near the fissure, it ought to be snipped off when the ulcer is incised; otherwise the latter will not heal. Moreover, any derangement of the general health which may be present must be attended to.

Chronic ulceration of the rectum, with thickening of its coats, arises as one of the secondary effects of syphilis. It may also be due to the deposit of tubercle, the ulceration not going on to perforation of the coats of the bowel; or it may simply be owing to a depressed state of the general health. The ulceration is to be cured by treating the cause of the morbid action, by rest in the recumbent position, and by the employment of anodyne suppositories.

An intractable *rodent ulcer* has been met with at the margin of the anus, the sore gradually creeping up the rectum. Excision, or at least complete destruction with potential caustics, ought to be had recourse to. Where an operation is impracticable, an ointment of sulphate of zinc (F. 294), steel with arsenic (F. 381, 399), and cod-liver oil, are the remedies to trust to. *Chancres* are also sometimes found in the same situation.

Stricture of the rectum may arise from chronic inflammation of the mucous membrane and submucous connective tissue. It appears to be slightly more common in women than men, probably because the former are subjected to more numerous sources of irritation. One case has come under my observation in which the disease was attributed to a very lingering labor; and certainly the pressure of the fœtal head, perhaps for three or four days, would seem likely to set up inflammatory action. The stricture may be limited to a ring of condensed tissue, when it is said to be of the annular form; or it may be confined to one side of the bowel, as when it follows the healing of an ulcer; or almost the whole of the gut may be narrowed and indurated. In the King's College museum there is a prepa-

ration showing great thickening of the entire walls of the rectum, the hypertrophy being such that the passage is greatly contracted. Above the stricture the bowel is usually somewhat dilated. In the majority of cases the constriction is within two inches of the anus, so that it is readily reached by the finger; but now and then it is placed higher up, and even at the juncture of the sigmoid flexure of the colon with the rectum, when the careful use of the bougie will be needed to detect it. The disease is essentially chronic, the contraction increasing slowly. It produces constipation, small stools, great difficulty in voiding solid motions, straining and bearing-down efforts, pain in the loins and sacrum, mental depression, flatulence, and a mucous discharge. After a time the mucous membrane may ulcerate: the ulceration giving rise to a burning pain in the bowel, with occasional discharges of blood. This form of stricture must not be confounded with simple spasmodic contraction of the canal, such as may at times arise when the part is irritated by hæmorrhoids, ulcer of the anus, &c. It must also be carefully distinguished from constriction due to malignant disease. Fibrous tumors of the uterus, when they fill the pelvic cavity, compress the rectum and prevent the passage of solid fæces; so that without an examination an erroneous diagnosis might be made.

The treatment required for the cure of stricture is troublesome and tedious. In some instances dilatation by bougies suffices, if care be taken to pass an instrument occasionally for several months after an apparent cure, and indeed until all traces of indurated tissue have become absorbed. Where the contraction is great, a sponge-tent (F. 426) may be employed at first, bougies being subsequently used. For the relief of a callous annular stricture it will perhaps be advisable to make four or five slight notches in different parts of the ring, with a straight probe-pointed bistoury; afterwards plugging the part with oiled lint, and at the end of a few days beginning the use of bougies. In all cases the motions should be kept soft by sufficient doses of simple electuary (F. 194). To relieve pain, suppositories of opium and belladonna (F. 340) answer better than any other remedies.

There are two forms of *prolapsus of the rectum*. In one, the most common, there is protrusion of only the mucous membrane: in the other, all the coats of the bowel are prolapsed. This disease is not unfrequently met with in children, especially in such as are badly nourished or have a strumous taint. Want of tone in the sphincter ani, constipation, straining at stool, prolonged diarrhœa, the irritation of worms, disease of the urinary organs, stone in the bladder, &c., are its chief causes. The size of the protrusion varies. There may be only a fold of mucous membrane forced down, or the inverted bowel will perhaps be prolapsed to the extent of five or six inches. Moreover, at first, the protrusion occurs only when the bowels act; but after a time the descent may follow any exertion, such as standing, coughing, &c., so that there is almost constant prolapsus. In the latter cases the intestinal mucous membrane gets indurated, and occasionally ulcerated; the sphincter ani becomes exceedingly flaccid, and the surrounding tissues relaxed; while there is a general sense of weight and distress about the body, with pain, which is greatly aggravated on attempts at defecation.

In the treatment of these cases we have to reduce the prolapsus, and to prevent its return by removing the cause. The replacement is seldom attended with difficulty, though a little patience may be needed. In some children directly the bowel is returned it is forced down, and this happens again and again; but the tendency to protrusion can generally be overcome, for the time, by making pressure with a pad of lint and then draw-

ing the buttocks rather firmly together with a broad strip of adhesive plaster. The general health must always be attended to; plain nourishing food being allowed, with bark or steel or cod-liver oil as may be necessary. Care is also to be taken that the secretions are natural and that the bowels act regularly; small doses of mercury and chalk, of taraxacum, of magnesia, or of cream of tartar, often acting beneficially. After each evacuation the bowel is to be immediately replaced, the anus well sponged with cold water, and an astringent injection thrown up. The latter may consist of a little alum and decoction of oak-bark (gr. 10 to fl. oz. iij), or of the tincture of perchloride of iron and water (min. xx–xl to fl. oz. iij). Occasionally, a suppository made with from five to twenty grains of tannic acid and thirty of cocoa butter, has seemed to me much more efficacious than the astringent enemata. Care is also to be taken that the seat of the water-closet is a proper distance from the ground—neither too high nor too low. With regard to young children, too, it is often advantageous to make them pass their motions in a recumbent posture, so as to prevent violent straining.

When medical treatment does not succeed, recourse must be had to a surgical operation. Different proceedings have been recommended, but in bad cases they are all, with one exception, very apt to fail. Thus, I have known instances where either the nitrate of silver, nitric acid, potassa fusa, or the actual cautery, has been applied to the mucous membrane so as to produce superficial sloughs; and this treatment proving useless, two or three folds of mucous membrane and skin at the margin of the anus have been excised. In one instance the surgeon had even cut out a portion of the sphincter muscle, with the effect of somewhat constricting the anal orifice; but a few weeks after the operation the bowel came down as badly as before. The really most efficacious plan is that proposed by the late Mr. Copeland; which consists in taking up several small folds of the mucous membrane at different points of the prolapsed bowel with the forceps, and very tightly ligaturing their bases. The ends of the ligatures are then to be cut off, the intestine returned, and a dose of opium administered. The patient keeps in bed for some days, while the ligatures come away; and he must not be surprised should the bowel afterwards descend occasionally, as it may do so until the several ulcers have contracted and healed. I have found this simple proceeding act very favorably in females, without inducing any bad after-consequences. It is apt to be followed by retention of urine, but the catheter will only have to be used for a day or two.

Polypus of the rectum is more common in children than in adults. The pedunculated growth arises from the mucous membrane, and it may be either soft or follicular, or firm and fibrous. The chief symptoms are uneasiness about the fundament, a frequent desire to go to stool, and a mucous discharge which is more or less mixed with blood. The growth generally descends when the bowels act, and has to be replaced. I have only met with some three or four examples of rectal polypi in women and children, and in these cases I have removed the growth with a blunt pair of scissors. But I think, as a rule, that it may probably be safer to apply a ligature and then to cut off the tumor below it, since, if hemorrhage did happen in any instance there would certainly be a difficulty in checking it.

A *villous tumor*, very similar to that which occurs in the bladder, has in a very few instances been found growing from the mucous membrane of the rectum. Such a growth generally has a broad base, while it is chiefly remarkable for its excessive vascularity, and consequently for its tendency to bleed. In the four or five cases which have been recorded, a permanent cure seems to have resulted from the removal of the tumor by ligature.

The functional affections of the rectum give rise to as much mental and bodily suffering as the diseases attended with change of structure. *Simple neuralgia* of this part may persist for many weeks, without altogether subsiding for a day. The passage of the motions aggravates the pain, and though there may be a frequent desire to go to stool, yet little or no fecal matter follows many of the attempts at evacuation, since there is usually troublesome constipation. In some cases the patient points to one spot as the seat of a fixed pain, though on an examination no breach of surface can be detected. The treatment consists in improving the general health by nourishing food, with pepsin (F. 420) to aid digestion, if needful; in administering quinine or zinc, steel, and cod-liver oil; in keeping up a regular action of the bowels by simple enemata (F. 188); and in relieving the perverted or augmented sensibility by suppositories of opium and belladonna (F. 340).

An irritable sphincter muscle causes symptoms somewhat resembling those due to an ulcer, but of less severity. There is pain in defecation, while, if the finger be introduced into the bowel, the muscle will grip it tightly, the sphincter being felt like a firm and hard ring. Nervous women seem most liable to this spasmodic affection, often suffering from it rather severely during the time that the catamenia are on. A cure may generally be effected by improving the nervous tone, by using mild laxatives, by employing an ointment of belladonna and iodide of potassium (F. 307) around the anus, and by the occasional passage of a bougie.

The opposite condition to the foregoing, or *atony of the rectum*, may arise with a healthy or a morbid condition of the sphincter. The impaired power of the muscular coat of the bowel deprives the patient of the force necessary to completely expel the stools, so that the fæces frequently accumulate until there is great distension. Complaint is made of constipation, tenesmus, a sense of weight and fulness, and often of forcing pains. On making an examination a hard mass of fecal matter will be felt blocking up the bowel, which mass will have to be removed by the scoop. The re-accumulation may be best prevented by tonics containing zinc and extract of nux vomica (F 409). If any aperient be needed, one or two grains of the extract of Barbadoes aloes, with the same quantity of quinine should be taken at dinner.

Pruritus of the anus is a troublesome affection not uncommonly met with in patients suffering from hæmorrhoids, dyspepsia, or intestinal worms—particularly the oxyuris vermicularis. Old people often complain of it, while it also afflicts many women towards the end of pregnancy, or such as have uterine disease, or those who have recently got over "the change of life." The itching is aggravated by warmth; it is worse at night than at other times, and it often prevents sleep. The friction resorted to for relief causes the tissues about the anus to become thickened and furrowed.

The treatment which will be found most successful consists in the use of cold bathing or sponging; daily exercise in the open air; a diet free from seasoned dishes, coffee, and all kinds of alcoholic stimulants; and a cool bed-room, with a mattress instead of the enervating feather-bed. A regular action of the bowels is to be maintained, and hence it may be necessary to order an electuary of sulphur and taraxacum (F. 194), or small doses of rhubarb and blue pill (F. 171), or simple enemata (F. 188). The best local remedies are tobacco-water (F. 265), or a lotion of corrosive sublimate and prussic acid (F. 263), or a wash of borax with morphia and glycerin (F. 268), or the application of a piece of lint dipped in the liquid extract of opium, or the use of the vapor of chloroform. In obstinate cases the physician will have to administer arsenic with some bitter infusion (F. 52),

or iodide of iron and sarsparilla (F. 32), or tar pills or capsules (F. 36). An examination should always be made so as to detect, and subsequently to remove, any local cause which may be present, and more especially to make sure that the irritation is not due to the presence of pediculi.

The rectum and anus, like other organs of the body, may be absent or malformed. These *congenital imperfections* have been well described by Mr. Curling, Mr. Ashton, and many French and German authors, but the most complete account of them is to be found in the excellent work of Dr. Bodenhamer.* They are but rarely met with. Thus at the Dublin Lying-in Hospital, during the seven years' mastership of Dr. Collins, there were born 16,654 children, in only one of whom was there an impervious condition of the gut. And again, at the same institution, 13,933 children were born during the seven years commencing November, 1847, out of which number three had imperforate anus and one an occluded rectum (Drs. Johnson and Sinclair). In some cases the child is born with every appearance of healthy conformation, but in others the defect is at once appreciable. Hence, the accoucheur should always be careful, in examining the newborn infant before it is dressed, to see that the anal aperture appears well-formed.

The chief varieties of these congenital vices of conformation, are the following:

1. *Preternatural narrowness of the anus.* In most cases the contraction can be overcome with small sponge-tents and bougies. If, however, the symptoms are urgent and the contraction very great, the aperture should be enlarged by making three or four notches with a probe-pointed bistoury. A tent of oiled lint must be introduced, and subsequently the orifice ought to be kept sufficiently dilated with bougies.
2. *The anus imperforate with the rectum normal.* There is either a persistence of the membranous septum of fœtal life, or a prolongation of skin over the aperture of the bowel. In either case, the meconium distends the part and therefore marks the site for an operation. This consists in making a crucial incision, removing the angles of the flaps, and subsequently introducing a bougie every day until the parts are healed. Where the septum appears to be thin, a puncture with the bistoury might suffice.
3. *The anus entirely absent with partial or complete non-development of the rectum.* An incision may be made at the site of the normal situation of the anus, and if the bowel be reached it is to be gently drawn down, opened, and its edges secured to the margins of the external wound. If, after penetrating to the depth of an inch, the gut cannot be detected, the practitioner should wait a few hours; since the rectum will perhaps be forced down as it gets distended with meconium and is no longer kept back by resisting tissues. When these attempts to reach the bowel fail, colotomy in the left groin, or less preferably in the left loin, is the only resource.
4. *The anus absent, but having its office fulfilled by a preternatural opening in an abnormal situation.* Frequently no interference is required in early life. Subsequently, the patient may be anxious for an attempt to be made to procure an outlet for the fæces at the natural site, but any operation for this purpose is attended with danger. Sometimes the unnatural orifice is in the vagina, in the male urethra, &c.

* A Practical Treatise on the Etiology, Pathology, and Treatment of the Congenital Malformations of the Rectum and Anus. New York, 1860.

5. *The anus normal and opening into a cul-de-sac; from the upper part of which extends the rectum contracted to the size of a small cord, or having its walls thickened and firmly glued together, or being entirely absent.* The diagnosis is very difficult, and always uncertain. Colotomy in the left loin will generally be found the only available resource.
6. *Anus, rectum, and colon absent.* In some of these cases there has been an opening in the abdominal walls or in the loins, communicating with the cæcum or with the small intestines.

2. FISTULA IN ANO.—An abscess not unfrequently forms in the loose areolar tissue around the rectum, either as the result of local irritation or of some constitutional affection. It may be deepseated, the pus quickly increasing in quantity, and having a tendency to burrow backwards; this form being accompanied by severe throbbing pain, and considerable disturbance of the system. The superficial abscess gives rise to much less suffering, is small, and soon points externally. The treatment of either variety consists in the application of poultices, rest in bed, and in letting out the pus immediately fluctuation can be detected. After this evacuation the part may thoroughly heal, and complete recovery follow. But more frequently, owing to the constant action of the sphincter and levator ani muscles, the wound merely contracts, a fistulous passage by the side of the rectum resulting.

There are two forms of fistula; one *complete*, in which a probe can be introduced from the external orifice upwards into the bowel; and the other a *blind external fistula*, where the mucous coat of the rectum is not perforated. The external aperture in either kind is often small, and not easily detected; it is generally placed near the anus, but sometimes is one or two inches distant; and it may be concealed in a furrow, or can be found in the centre of a little button-like eminence. The complete fistula is much the most common; while it proves the most annoying, inasmuch as flatus and intestinal mucus and fluid fecal matter pass along its track, giving rise to great discomfort as well as to painful spasmodic contractions of the sphincter. The irritation of these foreign matters occasionally produces recurrent attacks of inflammation and suppuration; so that the sinus, instead of remaining simple, has one or more tracks branching from it. Fistula in ano often coexists with phthisis, being probably due to tubercular inflammation of a portion of the rectum, followed by ulceration and perforation. Suppuration is set up in the connective tissue by the irritation of feculent fluid; and in a short time the abscess bursts externally, the opening and sinus subsequently remaining patent.

Some few fistulæ will heal kindly when attention is paid to the general health, when the parts are frequently bathed with tepid or cold water, and when some astringent lotion (F. 264) is daily injected along the sinus. But, in the majority of cases, a cure can only be effected by dividing the tissues which intervene between the external and internal opening, including the fibres of the sphincter ani. The performance of this operation is not forbidden by the presence of tubercle in the lungs, provided the pulmonary disease be neither far advanced nor running a rapid course. As a rule, I always recommend a consumptive patient who is improving under treatment and gaining weight, to allow the beneficial action of remedies to be as little interfered with as possible; and I regard an anal fistula as one of those complications which can only exert an injurious influence, while the operation required for its cure may be said to be simple and harmless.

3. HÆMORRHOIDS.—The tumors known as hæmorrhoids [*Αἷμα* = blood + *ῥέω* = to flow], or piles, are divided into two varieties—the *external*, or those situated outside the sphincter muscle, and the *internal*, or those within it. In many cases the two kinds are found coexistent. They are rarely met with until middle age, and are generally believed to be more common in women than in men. As sedentary occupations tend to produce them, this opinion is probably well-founded. Amongst their other causes may be mentioned pregnancy, abdominal tumors, habitual constipation, and all diseases that retard the return of blood from the rectum; also the frequent use of drastic purgatives, which tend to produce congestion of the bowel; together with a torpid action of the liver, disorders of the urinary organs, straining to pass hardened fæces, overrich living, insufficient exercise, an hereditary tendency, and a long residence in tropical climates.

External hæmorrhoids consist either of a knot of varicose veins, or of one or more cutaneous excrescences. In the first case the veins may contain fluid blood; but more frequently their contents have coagulated, so that we find one or several tense and purple and teasing swellings. Generally speaking these sanguineous tumors are due to the rupture of one of the hæmorrhoidal veins, with the formation of a very delicate cyst round the extravasated clot. The presence of this cyst is best made out by soaking it in water, when the contents will be found to remain unchanged, the little currant-like clot not diminishing in size. When such piles are painful great relief can be afforded by incising them and squeezing out the clots. With regard to the cutaneous excrescences, they consist chiefly of hypertrophied skin and connective tissue. They are seldom single, while not unfrequently there is a more or less prominent ring of them at the margin of the anus.

The treatment of external piles is directed either to the mitigation of the heat and tingling and discomfort, or to the complete removal of the tumors. Generally, the latter can only be effected by excising the growths with a pair of curved scissors, allowing the wound to heal in the ordinary manner. The operation is seldom followed by much bleeding, yet if any artery be seen pumping out blood it should be secured. Moreover, the integument at the base of the pile must not be cut too freely, or troublesome contraction of the anus will follow upon the completion of cicatrization. But in very many instances great, if not permanent, relief may be given by more simple measures. First, by regulating the bowels, taking care that a daily evacuation is produced without any straining or irritation. This may easily be done by administering some aperient confection (F. 194), or by giving a dinner-pill containing the extract of Barbadoes aloes, with a little pepsin or nux vomica (F. 155, 175), or by the use of simple enemata (F. 188). Then the anus should be thoroughly sponged with cold water every night and morning, as well as after each action of the bowels; while if the tissues be relaxed and indolent, some tannic acid, or alum, or solution of subacetate of lead, can advantageously be added to the water. The application of the ointment of galls and opium often affords comfort. The diet ought to be regulated, plain nourishing food being allowed; but alcoholic stimulants, coffee, and highly seasoned dishes, had better be interdicted. Plenty of walking exercise is also important. Supposing that the piles are inflamed, the morbid action may be controlled by hot bathing and the use of poultices, or very often the application of ice acts more speedily and effectually. And lastly, if the tumor be swollen and sensitive, the evacuation of the contained clot, as before mentioned, is the plan to pursue. Although this proceeding is very simple, yet the patient should keep the recumbent posture for some hours afterwards to avoid all risk of hemorrhage.

Internal hæmorrhoids are of three kinds. Most frequently we find them in the form of spongy vascular growths, having a red granular appearance, and a soft elastic texture like that of erectile tissue. A second variety is made up of the lower branches of the plexus of hæmorrhoidal veins, which branches are dilated and often plugged with coagula. While a third kind consists of pendulous tumors composed of fibro-areolar tissue.

Internal piles are either single or multiple. They protrude during defecation; but in time, as the sphincter becomes dilated from their pressure and relaxed by the attacks of hemorrhage, they are found to be constantly down, save when the patient is in the recumbent posture. Where they only appear externally at the time the bowels are moved, they especially require to be replaced directly after the stool, since if this precaution be neglected they are apt to become congested and inflamed, owing to the constriction of the sphincter. The bleeding varies from a mere tinging of the evacuations to the escape of many ounces, and though the blood is occasionally venous, yet much more commonly it is arterial. Sometimes the flow seems to take place periodically, in which case it may serve to relieve congestion of internal organs—particularly of the liver. When it is remembered that hæmorrhoids are symptomatic of disordered digestion, hepatic congestion, or of some disease interfering with the circulation, and that they produce constant uneasiness, irritability of the bladder, an annoying, muco-purulent discharge, with frequent losses of blood, it is not surprising that patients afflicted with them become thin and low-spirited, sallow and anæmic.

In the treatment of internal as of external piles it is of great importance to remove and prevent congestion of the abdominal viscera, to insure a healthy action of the bowels, and to look carefully to the general health. Sometimes the injection of half a pint of cold water every morning proves useful; while some astringent (matico, tannic acid, alum, or tincture of perchloride of iron) may be added to it, if there be hemorrhage. When the patient is unable to replace the protruded piles, the practitioner must do so for him; first puncturing them freely, if they are painful and swollen. In a few instances, where there has been delay in seeking advice, the amount of constriction has been such, that strangulation and mortification have occurred; so that nothing could be done but poultice the tumors until they have sloughed off, while the suffering has been relieved by full doses of opium.

A radical cure must be made in those cases where the piles are large and painful and bleed freely, and where the constitution is suffering from them. This may be effected by cauterization, excision, or the ligature. Prior to either operation any derangement of the liver which may be present ought to be relieved; while the bowels are to be thoroughly cleared out with a dose of podophyllin or calomel, followed by castor oil.

Cauterization only acts favorably if the growths are small, vascular, and florid. The tumors being well protruded, every part of their surface is to be painted either with nitric acid, the acid solution of nitrate of mercury, or with potassa fusa; taking great care to avoid touching the skin, and afterwards oiling the parts well before replacing them. The eschar usually separates in a few days; while provided the contraction produced by the inflammation and cicatrization be sufficient, a second application of the caustic will be uncalled for.

Excision is a very effectual proceeding, and possesses many advantages; though it is open to the great objection of being often followed by dangerous hemorrhage. To remedy this, some surgeons have employed the écraseur; but the chain of this instrument can seldom be adjusted without difficulty, hemorrhage has followed its use, and in some cases anal stricture

has subsequently occurred owing to undue contraction of the cicatrix. With the same object of preventing hemorrhage Mr. Henry Smith has invented a clamp (an improvement on the instruments previously used), by which the base of the tumor can be held and compressed for a few minutes, while the free portion of the tumor is excised. The divided surface being carefully dried, strong nitric acid or the actual cautery is applied; and the parts being oiled the clamp is taken off, and the patient put to bed, where he remains for two or three days.

The operation by *ligature* is that commonly practiced; for though the cure is rather tedious yet it is certain, while it can be accomplished without much pain or any danger. As regards the latter point it is simply sufficient to say, that Mr. James R. Lane has performed this operation in 427 cases with two deaths. The ligatures are applied in this manner: The pile being well forced out (by the use of a warm water lavement, if necessary), the surgeon draws it down with a pair of pronged forceps, makes a deep groove with the scissors at its base, and then encircles it tightly and securely with a ligature of waxed twine. If the tumor be large, it is better to tie it in two portions by means of a double ligature passed through its base with a curved needle. The operation is to be repeated on all the piles separately, so that each may be fairly strangulated. After tightening the ligatures the bulk of the piles can be cut off, and the parts replaced within the sphincter. Any redundant masses of skin at the verge of the anus had better be then snipped off. A full dose of opium should be subsequently given, ice may be applied if there be much pain, constipation is to be maintained until about the fourth morning, and the patient ought to be kept in the recumbent posture until the ligatures come away on the sixth or seventh day. In a very few instances tetanus has followed upon this operation, which should therefore be postponed if cases of this fatal disease have been at the time at all more frequent than usual after other surgical proceedings. Examples of erysipelas and pyæmia have very rarely been met with.

4. CANCER OF THE RECTUM.—Malignant disease in this situation may be of the scirrhous, medullary, or colloid form. The early symptoms are not well marked, little suffering arising until a difficulty is experienced in passing the stools. Consequently, when the practitioner is consulted the coats of the bowel are generally found extensively infiltrated with cancer, producing considerable contraction. Severe lancinating pains are then complained of, the nights are almost sleepless, and there are frequent attacks of hemorrhage; while there is an abundant offensive and purulent discharge, together with considerable debility and loss of flesh. If the disease be situated at the upper part of the rectum, it may escape detection unless the examination be carefully made; but in most cases by the time advice is sought the growth has extended downwards within easy reach of the finger, and then the gut has also become firmly fixed. In women, as ulceration goes on, a communication is often effected between the vagina and rectum.

The *treatment* consists in palliating the severe suffering which is always produced, sooner or later, by this affection. The bowels must not be allowed to get blocked up, and yet opium in some form is absolutely necessary. In many instances, however, the constipating effect of this drug will be overcome by combining the extract of belladonna with it, as is done in F. 339, 340, 343. So also the hypodermic employment of morphia and atropine (F. 314) is less frequently productive of constipation, than the exhibition of the morphia salt alone by the mouth. Indian hemp, aconite, chloroform, and ether, may all be useful in various combinations (F. 315, 317,

330, and 337). In this disease, as well as in stricture of the rectum, obstinate constipation, &c., a tolerably regular action of the bowels can oftentimes be maintained by injecting into the rectum five or six ounces of linseed or olive oil, gently warmed by standing the bottle in hot water. The oil must be retained to be really efficient. At the end of some twenty-four or even forty-eight hours it will produce a soft motion, this effect being repeated daily for perhaps a week. Then when the constipation recurs, the oil is to be employed again. Where there is such a rare occurrence as almost complete closure of the bowel by the disease, before the powers of life have become much deteriorated, existence may be prolonged for a few months by making an artificial anus in the left loin. Mr. Curling mentions a case where Mr. N. Ward performed colotomy under these circumstances, and where the patient survived the operation for eight months; much relief being afforded by the diversion of the stools from the cancerous mass.

Epithelial cancer sometimes attacks the anus, and may extend up the rectum. In a remarkable instance which had resisted the application of potential caustics, and which had returned after the performance of excision by Prof. Siebold, Mr. Curling repeated the latter operation. This gentleman took care to cut wide of the affected tissue, while he removed nearly the whole of the sphincter muscle on the right side. When I last heard of the case seven years had gone by since the operation without any relapse; though for the last of these years there had been a tumor of a doubtful nature high up in the pelvis.*

* Observations on the Diseases of the Rectum. Third edition, p. 154. London, 1863.

PART VIII.

DISEASES OF THE LIVER.

THE liver, situated chiefly in the right hypochondriac and epigastric regions, is the largest gland in the human body; measuring some twelve inches in its transverse diameter, and about seven in its antero-posterior. Its weight in healthy adults is generally allowed to be from 2 to 4 lbs. avoirdupois; though remarkable differences are to be found in the statements of authors on this head. According to calculations made by Dr. Frerichs, from some eight hundred observations, the actual weight varies from 1.8 to 4.6 lbs. avoirdupois; the relative weight fluctuating between the one-twenty-fourth and one-fortieth of that of the body. The liver is increased in size during the progress of digestion; partly because there is a greater afflux of blood to it at this time, and partly owing to the deposit of amorphous matter in the hepatic cells.

The following vessels are found in the liver: large and numerous lymphatics, biliary ducts, together with branches of the portal vein and of the hepatic artery and of the hepatic veins. The branches of the biliary ducts converge into two large trunks (one from the right and one from the left lobe), which leave the liver at the transverse fissure; these trunks by their union constituting the hepatic duct. The latter then joins with the cystic duct, forming the ductus communis choledochus; this channel opening into the descending portion of the duodenum by an orifice common to it and the pancreatic duct. The portal vein and hepatic artery are the afferent, while the bile-ducts and hepatic veins form the efferent vessels. The portal vein carries to the gland the blood from which bile is to be secreted; while by the hepatic artery aerated blood is supplied for the nutrition of the capsule, for the coats of the ducts and bloodvessels, as well as for the other parts of the organ. The bile-ducts take away the biliary secretion which has been separated or manufactured by the hepatic cells from the portal blood; while by the hepatic veins the residue of blood is returned into the general circulation through the inferior vena cava.

The four operations conducted by the liver, as well as the nature of the bile, have already been noticed (p. 45). It only remains, therefore, to add that the secretion of bile (the most significant function of this gland) is *increased* by rich abundant food, spices, and alcoholic drinks; by indolence and heat; by mercury (?); by podophyllin, taraxacum, and rhubarb; by the chloride of ammonium; as well as by the mineral acids and benzoic acid. Conversely, it is *diminished* by a light diet, with the avoidance of all alcoholic fluids; by exercise and early rising; by residence in a temperate atmosphere; by the iodide and bromide of potassium; by all the preparations of opium; and by carbonate of soda taken while digestion is going on.

The diseases which lead to *enlargement of the liver* are congestion, hyper-

trophy, inflammation, and abscess; fatty degeneration, and particularly lardaceous or amyloid disease; various new formations, but especially hydatid tumors and cancer; and enlargements of the gall-bladder, due either to an accumulation of bile, owing to some impediment to its escape into the duodenum, or to inflammation of the coats followed by suppuration, or to cancerous infiltration of the walls, or to the presence of a few large gallstones, or of numerous small ones. *Hepatic enlargement is simulated* in cases of spinal curvature; in congenital malformations and transpositions of the gland; in displacement downwards from the continued use of badly made stays, or stays habitually laced too tight around the lower part of the chest; in diseases of the thoracic viscera (*e. g.*, pleurisy with effusion, dropsy of the pericardium, and intra-thoracic tumors) causing depression of the diaphragm with enlargement of the chest at the expense of the abdomen; in abscess of the diaphragm, as well as in those rare cases where this muscle becomes the seat of tumor or cancer; and lastly, in diseases of the abdominal viscera, when the liver and other organs are pushed upwards so as to lessen the size of the thorax.

Diminution of the liver takes place in cirrhosis, acute atrophy, and in those diseases of the gland or of distant organs which lead to chronic atrophy.

I. CONGESTION OF THE LIVER.

The hepatic circulation is affected by so many different agencies, that hyperæmia, congestion, or the undue accumulation of blood in the capillary vessels of the liver, is a morbid state frequently met with. Moreover, it is the initiative step in almost all the structural diseases of this organ.

The simplest form of this condition is that which results from some obstruction to the circulation of the blood through the hepatic and the portal veins—*passive congestion*. Examples of this variety are met with in cases of valvular affections of the heart, as in instances of mitral obstruction and mitral insufficiency, and more particularly where there is incompetence of the tricuspid valves; in those morbid states of the lungs which impede the passage of the blood through the pulmonary artery, such as emphysema, collapse, &c.; as well as in the diseases that diminish the size of the thoracic cavity. Violent exercise, particularly if taken soon after meals, gives rise to temporary engorgement of the liver; and to this is probably due that stitch in the side which compels the sufferer to rest for a few minutes. Under the influence of congestion the liver is found after death enlarged in every direction, with its capsule tightened or distended, and its parenchyma rendered tough. On making a section of the gland, dark-red patches may be seen, consisting of the gorged hepatic veins; around which are lighter-colored parts corresponding to the delicate branches of the portal vein.

During life, obstructive hyperæmia of the liver is attended with headache and a disinclination for exertion; frequent flushings of the face, with coldness of the extremities; and muscular pains about the loins and limbs. The colon is distended with offensive flatus; complaint is made of a sense of constriction and weight in the right hypochondrium; and there will often be slight jaundice, nausea, giddiness, and dyspepsia. The urine is scanty, high-colored, sometimes loaded with urates, while it frequently contains bile-pigment with traces of albumen; and then the bowels are con-

fined, and the hæmorrhoidal veins probably become enlarged. In all forms of hepatic sickness there is so frequently an aggravated attack of retching between 4 and 6 o'clock A.M., that this occurrence may almost be regarded, as a pathognomonic symptom. During health, percussion affords a dull sound from the sixth right rib down to the costal margin; whereas, in the state under consideration the area of the dulness becomes much more extended. Palpation, too, will detect the increase in size. Moreover, when any pulmonary or cardiac affection has been the first step in the production of the hepatic congestion, there will be all the symptoms of such primary disease; which also often subsequently ends by producing general dropsy, &c.

Our treatment can only be palliative. In the early stages saline purgatives (F. 141, 143, 150, 152) act favorably by causing a drain from the portal system. At a later period, the use of mild aperients must be combined with the employment of a mineral acid, or of ammonia, ether, &c. (F. 147, 161, 162). Benzoate of ammonia (F. 40) is serviceable if the urine be deficient in quantity or in acidity. Where the heart or lung affection which gives rise to the hepatic congestion is not far advanced, the careful use of the sulphur springs of Harrogate (F. 466), the waters of Carlsbad (F. 496), or those of Kissingen (F. 493), or of Marienbad (F. 497), will frequently afford considerable relief.

Passive congestion usually leads to a diminished excretion of bile; the secreting cells remaining active, but the passage of the bile from the lobules and through the small gall-ducts being delayed, owing to the compression which is exerted by the loaded bloodvessels. The ducts consequently become gorged with bile—*biliary congestion*. The same condition necessarily results from obstruction of the common excretory duct of the liver and gall-bladder. Supposing this congestion to be kept up for any length of time, the cells of the gorged lobules get impaired and their power of reproduction diminished; since not only is their nutrition interfered with, but they become atrophied when their functions are not duly called into play, just as all tissues do.

In *active congestion* the capillaries of the hepatic artery are chiefly involved; serious structural changes arising in proportion to the intensity of the hyperæmia, and the frequency of its recurrence. This state is brought about by causes which increase the functional activity of the gland. The chief of these are,—the presence of morbid matters in the blood; the suppression of habitual discharges, such as hæmorrhoidal flux, or of the catamenia at the critical period of life; a long residence in hot climates, particularly in marshy districts; deranged nervous influence, examples of which may be seen in hyperæmia from mental excitement; and probably atony of the bloodvessels, owing to disease of their coats. As has already been remarked, the liver always contains more blood, and its secreting cells are more active during the process of digestion, than at other times: hence excessive eating and drinking, irritating articles of food, alcoholic drinks, &c., must unduly stimulate this gland. The symptoms induced resemble those set up by passive congestion; save that they are somewhat less severe, and only of short duration. Strong healthy individuals, residents in a temperate climate, and who take plenty of active exercise, may counteract the evil effects which flow from a too rich and abundant diet; while those of sedentary habits who pamper themselves, are sure to suffer. The cure of these cases is to be effected by the removal of the cause. Great benefit will be derived from the use of horse exercise, hunting and shooting, daily walking, &c.; from the employment of laxatives containing rhubarb, aloes,

and sulphate of soda, &c. (F. 144, 145, 148, 172); from recourse being had, when necessary, to the mineral acids (F. 377, 378); and especially from the disuse of beer and ardent spirits, with the adoption of a simple diet, consisting partly of fish, poultry, rice, fresh vegetables, light claret, soda-water, and tea.

Extravasated masses of blood (*apoplexy of the liver*) are now and then found in the hepatic tissue or beneath its capsule, as the result of great congestion induced generally by morbid changes in the blood. These cases of hemorrhage may be met with in scurvy, in purpura, in ichorrhæmia, and especially in the malarious fevers of tropical climates. The extravasations are often numerous; while the blood will be found in masses varying in size from that of a pea to that of a hen's egg, or it may be infiltrated through the parenchyma, converting the tissue into a pulpy mass. The effusions are probably directly due to some disease of the coats of the vessels, such as fatty degeneration, leading to rupture.

The effusion of serum into the substance of the liver (*hepatic œdema*) is said by Dr. W. Thomson* to have been often observed, uncombined with marks of acute inflammation. It cannot be a common condition, however, since very few authorities make any mention of it. In a case of fatal remittent fever reported by Dr. Morehead, the liver was found of a dark olive color, reaching two inches below the right ribs, and touching the point of the eighth left rib. It weighed 4 lbs. 4 ozs.; while on cutting and pressing it, six ounces of serum freely oozed from the surfaces. The parenchyma broke down readily under the finger; and the incised surfaces presented a dark olive color, with brown intermixture, but not the mottled redness of congestion.

II. HYPERTROPHY OF THE LIVER.

Hypertrophy of the liver is characterized by an increase in the secreting cells, causing enlargement of the entire gland. There is no growth foreign to the natural structure to be found in the organ, but simply an excess of the normal tissue.

The hepatic cells may be either increased in size or multiplied in number; while in proportion to the increase the volume of the liver will become enlarged, perhaps to more than double its natural bulk. This hypertrophy not uncommonly arises from long-continued congestion, such as is met with among the residents of tropical climates or of malarious districts; while it can likewise occur in consequence of disease in other parts of the system. Thus, it has been sometimes found in leucocythemia, in phthisis, in dysentery, and in saccharine diabetes. Partial hypertrophy may be of a compensatory nature; that is to say, a portion of the gland having been rendered comparatively useless by disease, the healthy part has its cells enlarged so as to prevent systemic derangement.

The functions of the liver are seldom interfered with in true hypertrophy. But its correct diagnosis is important lest active remedies should be improperly used. If any good can be effected in these cases it is only by regulating the diet, and enjoining residence in a temperate latitude.

* A System of Practical Medicine, vol. iv, p. 180. Edited by Alexander Tweedie, M.D., &c. London, 1840.

III. INFLAMMATION OF THE LIVER.

The inflammatory diseases of the liver, though often met with in temperate climates, are particularly common in tropical regions. In describing them, I shall speak first of hepatitis—or inflammation of the peritoneal investment of the liver, or of the substance of the gland, or of both combined: secondly, of cirrhosis, or that slow form of inflammatory action which affects the areolar or connective tissue; thirdly, of syphilitic hepatitis; and, fourthly, of the diseases of the bloodvessels. The subject of inflammation of the gall-bladder and bile-ducts will be considered subsequently.

1. HEPATITIS.—The term hepatitis [from *Ἧπαρ* = the liver; terminal *-itis*] seems better than that of suppurative inflammation as proposed by Dr. Budd, inasmuch as the morbid action does not necessarily end in suppuration and abscess. However, the name is not very important, provided the nature of the affection be generally understood.

Causes.—Europeans residing in tropical climates, who live too freely, seem liable to suffer from hepatitis. The morbid action may be induced by some mechanical injury; though it is seldom that this is a cause. The disease is now and then due to ichorrhæmia from suppurative inflammation of the portal vein, or of the veins of the systemic circulation. Ulceration of the intestines, of the stomach, of the gall-bladder or gall-ducts, are all causes of suppurative hepatitis; and perhaps a hot climate alone, by deranging the functions of the gland, may give rise to it. So again, marsh fevers will originate it. Spirit-drinking often produces adhesive inflammation and induration of the liver (cirrhosis); but not the suppurative form.

Pathology.—In a few cases the coats of the liver and the capsule of Glisson become inflamed (*Perihepatitis*), without the peripheral tissue of the gland being implicated to any extent. This happens in general peritonitis, or it may occur in consequence of some wound or contusion. Occasionally too, the perihepatitis is the result of an extension of pleuritic inflammation on the right side; or it will ensue from disease in the liver itself, such as abscess, hydatid cyst, and cancer. The fever, pain, tenderness about the liver, and general disturbance, are often greater in this capsular inflammation than when the glandular structure is the seat of mischief. Suppuration, however, rarely follows: while the other results are very seldom serious unless the coats of the portal or hepatic veins get attacked, the inflammation generally soon terminating in resolution. Sometimes opacity and thickness of the capsule remain, together with adhesions between the apposed surfaces of the peritoneum.

Far more commonly, however, the substance of the liver is the seat of the inflammation. In a few instances the morbid action is diffusely extended over the whole organ (*Hepatitis diffusa parenchymatosa*); a form which may lead to softening and acute atrophy, or to general induration. The inflammation, however, is more frequently circumscribed (*Hepatitis vera circumscripta, suppuratoria*); and then abscess is a common result. The series of changes which take place in inflammation of the liver, as this disease is usually met with, have been so clearly described by Dr. Morehead, that I shall give a condensed account of that which he has sketched from actual observation.* In the first stage of parenchymatous hepatitis

* Clinical Researches on Disease in India. Second edition, pp. 827 to 830. London, 1860.

there is vascular turgescence; and could the gland be examined, the pathologist would find the structure redder and softer than natural, while blood would ooze freely from it when cut. At this period the inflammation often terminates in resolution; but if it proceed, then interstitial exudation of coagulable lymph soon follows in different parts of the organ, inflammation of the entire substance being very rare. When the lymph maintains the liquid form in which it is exuded, there is hope of complete recovery by reabsorption and resolution. Supposing, however, that it coagulates in the interstices of the parenchyma, then one of three conditions must ensue: either the liquid portion will be absorbed, and the solid lymph become organized into fibrous tissue; or the exuded lymph instead of undergoing organization, may re-liquefy, be absorbed, and disappear; or the lymph degenerates into pus, the tissues where it has been deposited soften and melt down, while the whole gets more or less circumscribed by membrane of low organization,—in short, hepatic abscess is formed. Then, more lymph exudes from the inner surface of the investing membrane, undergoes certain changes, and is converted into pus; the sac becomes distended, the bulk of the liver is increased, and tumefaction takes place; adhesion of apposing serous surfaces follows; and the circumscribing wall becoming thin on one side by the liquefying process, pointing and rupture succeed. This is just what happens in the case of an ordinary phlegmonous abscess; in which the central parts of the lymph (those most remote from the living tissues) change into pus, while the peripheral portions (those adjacent to the living structure) get organized into membrane. In the liver the abscesses are seldom single, though sometimes several small ones coalesce. They may also be superficial, or deepseated; but most frequently they are of the latter kind, and have their seat in the right lobe. Granting that diffuse suppuration of the liver is just possible, this occurrence must be very rare; since Dr. Morehead asserts that he has no knowledge of it.

Symptoms.—At the onset there is tenderness over the gland, which will always be most marked when the peritoneal investment is affected. Then, as the morbid action progresses, we find high fever, with a hot skin and great thirst and scanty urine; the fever sometimes assuming a typhoid character. There is also fulness of the right hypochondrium from enlargement of the gland, with increased dulness on gentle percussion; more or less severe pain in the region of the liver, aggravated on pressure or deep inspiration or coughing; and an inability to lie on the left side. Moreover, there will be occasionally a yellow tinge of the conjunctivæ, but rarely complete jaundice. More or less urgent dyspnœa, sympathetic cough and vomiting, and troublesome hiccup are generally present. Where the pain is of a sharp lancinating character, it is supposed to indicate inflammation of the serous and fibrous coverings of the gland; where dull and tensive, the parenchyma is the part affected. Again, where the convex surface of the organ is the seat of the inflammation, the chest symptoms will predominate; where the concave, the stomach derangements will be the most marked. It is well known that in hepatic affections, the right collar bone and shoulder become the seats of gnawing and aching sympathetic pains; while sometimes also (probably when the left lobe of the liver suffers) pain is referred to the left shoulder. According to Annesley, pain in the right shoulder is a sure indication that the disease is in the right lobe. Andral has noticed that in some instances the only pain has been in the head; and this has been sufficiently intense, constant, and long continued to attract exclusively the patient's attention.

The formation of hepatic abscess is chiefly signalized by the occurrence of chills, perhaps of unmistakable rigors, of hectic fever, gastric disturb-

ance, pain or tenderness, and tension of the abdominal muscles on palpation; with a feeling of weight in the region of the liver, and a dry cough. The physical signs of enlargement of the gland will be present; and a distinct tumor may perhaps be made out. While the hectic fever increases, the patient emaciates: there is progressive prostration, and either diarrhœa or dysentery sets in. A few remarkable cases have occurred, where the symptoms during life have been so obscure that suppuration has not been suspected; and yet a large abscess has been found on post-mortem examination, or even several collections of pus.

Terminations.—The most favorable termination of hepatitis is, of course, by resolution. Where this happens, the pain and fever gradually abate, and the patient is soon well. The inflammation may, however, as has already been shown, be so severe and extensive as to lead to diffused suppuration; although much more frequently it ends in the formation of circumscribed abscesses, or possibly in gangrene.

Abscesses of the liver not uncommonly attain a considerable size; and in extreme cases, have contained several pints of pus. The prognosis is always unfavorable. Now and then hepatic abscesses will possibly undergo a spontaneous cure, in consequence of absorption of the liquor puris and degeneration of the pus-corpuscles. Such abscesses have burst into the peritoneum, and given rise to fatal peritonitis. In a few instances they appear to have opened into the biliary ducts, so that their contents have passed into the duodenum. Most frequently, however, when the matter gets near the surface of the gland, adhesive inflammation is set up in the portion of peritoneum immediately above it, and lymph is poured out, which glues the organ to adjacent parts—to the abdominal parietes, the diaphragm, stomach, or some part of the intestines; the pus being then discharged externally by a direct opening through the walls of the belly, or indirectly through the lung, or stomach, or colon, &c.

Hepatic suppuration and dysentery from time to time occur together. Whether they are related to each other in the way of cause and effect has not been positively determined. Contrary to the general opinion, Dr. George Budd* has taught that the dysentery is, in at least most of the cases, the primary disorder, the abscess the secondary; the latter being caused by the fetid gaseous and liquid contents of the large intestine, or by the unhealthy pus resulting from its ulceration, being absorbed and conveyed immediately to the liver. Abscess of this gland may also occur from other causes besides those already mentioned, the most common being ulceration of the rectum, bladder, vagina, &c.

Very rarely the inflammation terminates in gangrene, or gangrene will follow suppuration. In one of the patients of the Dreadnought Hospital ship, mortification appeared to be the result of opening an abscess.

Treatment.—Various observers have recognized that the strength of the patient requires to be supported in this disease, rather than to be lowered by bleeding, and the administration of mercury. The latter remedy is, however, still used very indiscriminately; and Dr. Abercrombie's observation remains true, that mercury is employed "with very undefined notions as to a certain specific influence, which it is believed to exert over all the morbid conditions of this organ. If the liver is supposed to be in a state of torpor, mercury is given to excite it; and if it is in a state of acute inflammation, mercury is given to moderate the circulation and reduce its action."† But it may be laid down as a general rule that neither the ab-

* On Diseases of the Liver. Third edition, p. 86, &c. London, 1857.

† Pathological and Practical Researches on Diseases of the Stomach, &c., p. 360. Edinburgh, 1828.

straction of blood, nor the production of salivation, will exert any favorable influence in hepatitis. And further, experience seems to prove that every kind of active treatment is contraindicated; while it ought especially to be avoided when we infer that suppuration has taken place.

Purgatives, in the early stages of those cases not preceded by dysentery, appear to be useful by increasing the circulation through the portal capillaries, and thus diminishing congestion in the capillaries of the hepatic artery. If there be a suspicion of portal stagnation—as will be indicated by a yellow-coated tongue, scanty alvine discharges, a diminished secretion of urine, and a dingy state of the skin—then Dr. Morehead advises the employment of small doses of blue pill with ipecacuanha, or of the extract of taraxacum and an alkali, together with the external application of nitro-hydrochloric acid by means of a compress. Emetics have been recommended in the early stages; but though they promote the discharge of bile, yet the compression exerted on the liver by the abdominal muscles during vomiting may prove very unfavorable. Moreover, when nausea and vomiting have been set up by antimony or ipecacuanha, it is often difficult to subdue the irritability of the stomach; especially as the disease itself has a tendency to produce sickness. Sedatives will usually be indispensable, and there is no objection to the best agent of the class, viz., opium. Where dysentery is present, it must be checked by ipecacuanha, morphia, and astringents, according to the directions given at p. 584. In all cases at the onset, it will be necessary to restrict the diet; while the patient must be confined to the recumbent posture.

When the inflammation has gone on to the formation of pus, good nourishing food, with tonics (such as quinine and iron, the nitro-hydrochloric acid and bark) will be required. Where there is restlessness and pain, these symptoms should be subdued by opium; the bowels must be regulated by rhubarb, or by rhubarb and aloes, and wine ought to be allowed in proportion to the weakness of the patient. If, in the course of time, we feel quite sure that the surface of the abscess is adherent to the abdominal parietes, we can (after making an exploratory puncture with a grooved needle) open it with the knife, or what is perhaps better, may puncture it with a trocar. Great judgment and caution will have to be exercised, however; while on no account are mere exploratory punctures to be made in search of doubtful purulent collections. Even where the diagnosis is clear, Dr. Budd seems on the whole to be in favor of allowing the abscess to burst of itself. And I suppose that Mr. Waring is of the same opinion, for in the summary which this gentleman has published of eighty-one cases operated on, there are sixty-six deaths with only fifteen recoveries, and he fears that even this proportion appears too favorable owing to the non-publication of unsuccessful cases.

2. CIRRHOSIS.—Induration of the liver, or cirrhosis [from *Κιρρός* = yellowish], consists of chronic inflammation and hypertrophy of the connective tissue which pervades and covers the liver.

Causes.—The most common cause of cirrhosis is spirit-drinking, a circumstance which has led English practitioners to call this disease the *gin-drinker's* liver. When alcohol has been introduced into the system in the ordinary way by the stomach, analyses show that a greater proportion of it is present in the liver and nervous system than in any other organs of the body. Undiluted spirits are more injurious than those mixed with water, owing to their more immediate absorption from the stomach into the portal vein producing much greater irritation of the liver.

It is worthy of notice that the alcohol consumed in wine and beer is not

as destructive as that taken in the form of ardent spirits. Dr. Paris explains this by supposing that in the first case the alcohol is not only more intimately mixed with water, but that it exists in combination with its extractive matter, and consequently that it is incapable of exerting its full effects before it becomes altered in its properties, or, in other words, partially digested. A hot climate increases all the vicious effects of alcohol.

Pathology.—Interstitial hepatitis comes on gradually, while at first it gives rise to no peculiar symptoms. But as the connective or areolar framework slowly gets hypertrophied, the liver becomes abnormally firm and subsequently contracted. Hence results a diminution in the calibre of the branches of the portal vein, as well as of the hepatic artery and duct. From this, atrophy of the lobular structure of the liver ensues; the hepatic cells undergoing fatty or granular degeneration, or becoming completely destroyed in parts of the gland. The diminished flow of the blood through the portal vein favors congestion of the capillaries of the gastric and intestinal mucous membrane, whence arise hemorrhages; whilst it also produces engorgement of the capillaries of the peritoneum, and hence ascites results.

On slicing the gland it is found hard and tough, while the firm and thickened connective tissue is seen to form thin lines between irregular masses of lobules. At the parts on the surface corresponding to these lines the capsule is drawn in, so that the organ presents a "hob-nailed" appearance; the tissue of the liver is also paler than natural, owing to the presence of the broad lines of grayish-colored tissue, and it is often yellowish from an accumulation of biliary matter in the cells. Hence a section of the liver has the grayish-yellow color of impure beeswax; and this disease has, in consequence, been termed by the French *cirrhosis.**

Symptoms.—These are generally few and obscure until the effused fibrin begins to interfere with the flow of the portal blood, and to offer an impediment to the secretion and escape of bile. Slight enlargement of the liver is present in the early stages; but as the fibrous tissue contracts and the lobules atrophy, the size of the gland becomes diminished, while the spleen gets hypertrophied. Then pain in the right hypochondrium, indigestion, flatulence and constipation, occasional feverishness, a dry and rough skin, with an unhealthy sallow look, are the most prominent symptoms. When relief has been obtained by the use of purgatives and an abstemious diet, the patient probably fancies himself well and pursues his usual occupations, although at the same time he finds that he gets gradually weaker and thinner, and that his complexion remains sallow. After a time there are attacks of diarrhœa, the appetite fails, the urine gets scanty and is loaded with lithates, while the emaciation and debility increase.

At the end of some months, or not until the lapse of one or two years, the increasing contraction of the effused lymph greatly obstructs the circulation through the portal vessels; an exudation of serum takes place from the extreme branches of the veins converging to form the venæ portæ, and hence the belly becomes enlarged by dropsical effusion, which gradually increases so as to cause great distension. The veins on the surface of the abdomen get dilated—showing that the current of the portal blood is seriously impeded, and occasionally hemorrhage from the distended portal system gives rise to an effusion of dark blood into the stomach and intestines. In a few rare instances the attack of hemorrhage has constituted almost the first symptom of cirrhosis; so that death may really happen from this cause, if the loss of blood be very great, in the midst of apparent health. When ascites has once occurred it continues and increases, while in some

* See the works of Morehead and Budd, already quoted from.

twelve months or so the patient dies from exhaustion. Or a fatal termination will perhaps occur at an earlier period owing to pneumonia, peritonitis, jaundice and toxæmia, diarrhœa, or some other complication.

Treatment.—Although confirmed cirrhosis is quite incurable, yet it is probable that when the disease is early submitted to treatment its progress can be at least much retarded. At the commencement we shall do considerable good by insisting upon the complete disuse of all alcoholic drinks, by forbidding the employment of coffee, and curry, and highly-seasoned dishes, by supporting the strength with plain animal food, and by checking any complications as they arise. With regard to medicines, it will probably be found that aperients are always needed. Perhaps the most useful are the sulphate of magnesia (F. 141), or the sulphate of soda (F. 143), or the resin of podophyllum (F. 160), or the acid tartrate of potash with taraxacum (F. 194). An imitation of the Carlsbad waters (F. 181), has often seemed to me to act favorably, and consequently this mixture can be recommended where the patient is unable to drink the real waters at their source (F. 496), or to pay a visit to Marienbad (F. 497). Some authorities recommend cupping or the application of leeches over the liver. Where it is evident that the loss of blood cannot be borne, repeated small blisters may be employed; and considering that gin-drinkers are the last class of people likely to derive benefit from bleeding, it would seem better to have recourse to counter-irritants rather than to active depletion. Supposing there is a well-founded suspicion of any syphilitic taint in the system, iodide of potassium (F. 31) will probably do great good, following up its effects by quinine and the iodide of iron (F. 382), or especially by the waters of Kreuznach (F. 484), or perhaps of Aix-la-Chapelle (F. 483), or of Neuenahr (F. 485).

Where it is evident that the degeneration of the hepatic cells has become far advanced, then active aperients and mineral waters only increase the prostration and tend to hasten the setting in of dropsy. Attention must then be more directed to the condition of the digestive organs, aiding their action by the nitro-hydrochloric acid (F. 378), or by pepsin and extract of nux vomica (F. 420), or by tincture of rhubarb in some bitter infusion (F. 369). Inunction over the liver with the iodine (or the red iodide of mercury) ointment may sometimes serve to stimulate the eliminating function of so much of the gland as can act, when acholia seems to be threatening. Supposing there be hemorrhage, such astringents as turpentine (F. 102), gallic acid (F. 103), or nitric acid (F. 104) will be most likely to check it, very cold drinks being also allowed, while a bladder of ice should be occasionally placed over the abdomen. When ascites has taken place, mild diuretics, purgatives, tonics, and sedatives, are the agents with which we may hope to palliate the suffering and to prolong life for a short time. But if there be urgent dyspnœa or other general distress from the dropsy, the fluid ought to be removed by tapping, a proceeding, however, which does not afford satisfactory results, since the serous effusion is sure to reaccumulate in a week or two.

3. SYPHILITIC HEPATITIS.—Syphilitic inflammation of the liver is generally accompanied with other tertiary symptoms of the venereal infection. The disease manifests itself, according to Dr. Frerichs,* in three forms: (1) As simple interstitial hepatitis and perihepatitis. (2) As hepatitis gummosa, in which white depressions, like cicatrices, are

* A Clinical Treatise on Diseases of the Liver. Vol. ii, p. 152. Translated by Dr. Murchison for the New Sydenham Society. London, 1861.

found to contain yellowish nodules of a rounded form and dried appearance, varying in size from that of a linseed to that of a bean. And (3) as waxy, amyloid, or lardaceous degeneration, to be considered in a subsequent section. All three forms will perhaps be found coexisting in the same liver, or either may be present independently of the others.

The symptoms produced by the first two varieties are seldom very striking, for while one portion of the gland is being rendered unfit to perform its functions, other parts become hypertrophied and take on extra work. The diagnosis, however, is made somewhat easy by the presence of the syphilitic cachexia, and the other indications of constitutional infection. The spleen is also generally found enlarged in these cases. Sometimes there is albuminuria.

The remedies consist of iodide of potassium (F. 31), the mercurial vapor bath (F. 131), and rest from all mental or bodily labor. Where there are symptoms of renal disease the iodide of iron (F. 32) had better be alone trusted to.

4. DISEASES OF THE BLOODVESSELS.—The *hepatic artery* and its branches may be involved in disease affecting the liver generally,—as in cirrhosis, cancer, tubercle, &c., or this vessel will be the sole seat of morbid action, as is seen in atheroma of its coats, aneurismal dilatation, and obstruction of its canal. In many instances it is impossible during life to do more than guess at the exact nature of the affection. As regards aneurism of the hepatic artery, the chief indications are,—the presence of a pulsating tumor, pain from irritation of the hepatic plexus of nerves, and jaundice from the compression exerted on the biliary ducts. Generally, death takes place suddenly from rupture and internal hemorrhage.

The *portal vein* is now and then affected in different ways. Blood-coagula are at times found obstructing its channel; being formed under the same circumstances as those which give rise to thrombi in other parts, or from some disease confined to the liver and interfering with the circulation through it. As a general rule, these clots are the cause, not the result, of inflammation of the venous coats. The obstruction for the most part comes on some time after disease (cirrhosis, chronic atrophy, chronic peritonitis, &c.) has given obvious proof of its presence. The abdominal veins get prominent and dilated, there is diarrhœa with rapid wasting, the spleen becomes perceptibly enlarged, and a large quantity of ascitic fluid is rapidly poured out. The more sudden and complete the obstruction, the less time there is for the collateral circulation to be established; and consequently the more marked will be the effects. The fatal termination can sometimes be postponed by the use of astringents to check the diarrhœa and hemorrhage, by employing food which will be easily assimilated, and by the operation of tapping. The latter proceeding, however, is not to be resorted to until absolutely necessary.

The portal vein collects the venous blood from the digestive organs, and carries it to the liver. Inflammation, ulceration, or suppuration of the viscera in which the roots of this vein have their origin, is most frequently the cause of suppurative disease of the vein itself. This affection may also, however, have its source in inflammation of the bile-ducts, especially where the latter morbid process is due to gallstones. The prominent features of suppurative portal phlebitis are headache, violent fever, great prostration, rigors, profuse sweating, pains in the epigastrium or the right hypochondrium, bilious diarrhœa, enlargement of the liver and spleen, and jaundice. These effects are followed frequently by the symptoms of peritonitis, and

occasionally by metastatic purulent deposits in the liver or lungs, or joints; while they terminate in fatal exhaustion or coma. Remedies are of little avail; though quinine and opium may be employed to subdue the rigors and pain, while the patient's strength is supported by milk and raw eggs, solution of beef (F. 2), and demulcent drinks (F. 19).

With regard to adhesive inflammation of the portal vein but little is known. For frequently this condition cannot be distinguished from the other inflammatory diseases of the liver during life; while as it is not fatal like the suppurative form, recent examinations have not been made. The changes found after death, and which show that it has at one time existed, consist of certain linear fissures over the obliterated branches; together with atrophy of those lobules which are naturally supplied by them.

Rupture of the portal vein, the result of fatty degeneration of its coats, has been met with; so have ossification and calcification; while more commonly some of the branches have been found dilated, in consequence of the obstruction of others.

The *hepatic veins* commence in the capillaries of the venæ portæ, the three large branches which result opening into the inferior vena cava. These veins are generally found enlarged after death from valvular disease of the heart. They are very rarely the seat of adhesive inflammation; but when they are so, the morbid action gives rise to thickening of the coats, or to obstruction of the affected branches. Suppurative hepatic phlebitis is rather more common, occurring as the consequence of abscess of the liver. Blood poisoning generally ensues.

IV. SUPPRESSION OF THE FUNCTIONS OF THE LIVER.

The secretion of the bile may be more or less completely suspended [*Acholia*, from Ἀ = priv. + χολὴ = bile] owing to acute atrophy, as well as from cirrhosis, fatty degeneration, &c. This subject has already (p. 45) been generally treated of; but its importance is such that it requires further consideration.

1. ACUTE ATROPHY OF THE LIVER.—Acute or yellow atrophy of the liver (sometimes spoken of as *acute wasting*, *softening of the liver*, *diffused hepatitis*, or *fatal jaundice*) is one of the most remarkable diseases to which the human body is subject. It may possibly be owing to impaired nutrition, as a consequence of blood poisoning. It consists, as a rule, of a rapid and complete destruction of the hepatic cells throughout every part of the gland. But it seems impossible to doubt that in a few instances the disintegration of these cells has been less extensive; the secretion of bile being consequently very defective, yet not entirely suppressed.

Causes.—Women are more obnoxious to this very rare affection than men. Pregnancy appears somehow to predispose to it; while it has happened more frequently between the third and seventh months of gestation than at other periods. It would also seem to be most common from about the age of seventeen to thirty.

Among the alleged exciting causes it is necessary to mention grief or anxiety, sudden alarm, and fits of passion; venereal excesses, syphilis, and the excessive use of mercury; drunkenness with dissolute habits; the

influence of malaria; and the poison of typhus. Yellow fever has many points of resemblance with the disease under consideration.

Some remarkable cases are recorded, the majority of them soon ending fatally, where several members of the same family have been struck down in succession with acholia. Dr. William Griffin met with four instances in one household, all within a few weeks of each other, and all occurring without any preliminary remarkable symptoms to indicate the impending danger. Two of the patients recovered.* Dr. Hanlon attended three sisters who were attacked with this form of jaundice within eleven months of each other, only one of them being restored to health.†

Symptoms.—There may be a preliminary stage, during which complaint is chiefly made of headache, loss of appetite, thirst, drowsiness, mental and bodily depression, irregularity of the bowels, and tenderness of the abdomen. At the end of a variable period, the conjunctivæ become yellow, and the skin gets slightly jaundiced. These precursory symptoms may last a few days, or upwards of three or four weeks; while they will possibly be altogether absent. When present, they often fail to attract serious attention, the patient continuing to follow his usual occupation.

The symptoms which directly arise from acute atrophy of the liver are jaundice, sometimes with the formation of petechiæ and large ecchymoses; and vomiting, at first of the contents of the stomach with mucus, and then of a matter like coffee-grounds, owing to the presence of altered blood. The effects upon the nervous system are manifested at the onset by irritability and great despondency; but soon there is wandering, which merges into noisy delirium and convulsions, followed by stupor and deep coma. The pulse is at the commencement infrequent; though as the cerebral disturbance is manifested it rises in frequency to about 120, becoming slow again as stupor sets in, and getting frequent and small as the fatal termination approaches. The tongue and teeth are coated with black sordes; while the abdomen is often tender, pains being complained of about the epigastric and right hypochondriac regions. The extent of hepatic dulness rapidly diminishes, while that of the spleen increases. There is always obstinate constipation; hard clay-colored stools coming away under the influence of purgatives, with subsequently evacuations, which are black from the presence of blood. The urine is natural in quantity; and it generally flows away involuntarily, or an inability to pass it may necessitate the use of a catheter. On analysis, this secretion is found loaded with bile-pigment, and perhaps slightly albuminous; the natural solids being often diminished. A microscopic examination of concentrated urine will generally detect the presence of tyrosin and leucin; the former appearing as long needle-shaped crystals and small star-like bodies, while the latter are seen as finely marked laminæ and globular masses with fissured surfaces and concentrically thickened walls. These abnormal ingredients will be present in the urine, even though the kidneys have more or less lost their power of eliminating those solids which the renal epithelium naturally separates from the blood. Then lastly, the jaundice increases; bed-sores form over the sacrum, if life be prolonged beyond a week or ten days; and there are hemorrhages from the nose, stomach, bowels, bronchi, &c.

This disease usually ends fatally within a week from the appearance of the acute symptoms; while sometimes death occurs at the end of eighteen or twenty-four hours. It has been doubted whether recovery ever takes

* Medical and Physiological Problems, &c. By Drs. William and Daniel Griffin, p. 88. London, 1845.

† Clinical Lectures on the Practice of Medicine. By Robert J. Graves, M.D., &c. Second edition, vol. ii, p. 255. Dublin, 1848.

place; but although the cases in which the termination is favorable are very rare, yet it seems certain that some such have been met with.

Pathology, &c.—Examination, after death, reveals a considerable diminution in the size of the liver, the reduction being often to the extent of one-half or even two-thirds of the normal volume. The capsule is found opaque and puckered, while the parenchyma is flabby and shrunken; the cut surface presents a dark-yellow hue, the outline of the lobules is invisible, and the bloodvessels are almost empty. Under the microscope, either no hepatic cells can be detected, but only brown granules of biliary matter with oil-globules, or isolated cells, loaded with fat or pigment are discovered. The gall-bladder is usually empty, and the bile-ducts are free from any obstruction. In most of the recorded cases, the spleen has been congested and enlarged. Sometimes the glandular epithelium of the kidney has been found in a state of fatty degeneration.

"Acute atrophy of the liver," says Frerichs, "belongs to those obscure processes, as to the nature of which various opinions may be advanced, without it being possible for any one of them to obtain a general acknowledgment. The fact of the disappearance in a few days of one-half or one-third part of the original volume of a large gland abounding in blood, without any alteration in the bloodvessels leading to it, has a complete analogy in no other disease."* Rokitansky and others have referred the destruction of the hepatic cells to the action of an excess of bile in the portal system—to a bilious liquefaction. Buhl looks upon the disease as analogous to typhus. While again, it has been regarded as a diffused inflammation, the destruction of the cells by fatty degeneration arising from the accompanying acute exudation-process.

As no morbid appearances are found in the brain or its membranes to explain the nervous symptoms, they must be referred to changes in the blood. Frerichs attributes the cause of the blood-intoxication to the arrest of the hepatic functions consequent on the destruction of the secreting cells, and to the derangement of the renal secretion, so that the elimination of urea is stopped. The former of these causes includes not only the absorption of bile, and the retention in the blood of the substances from which this secretion is formed, "but also the cessation of the powerful influence which the liver exerts over the processes of metamorphosis of matter, and the simultaneous passage of the disintegrated glandular substance into the blood."

From the consideration of the chief points in a case of this affection which was admitted into the Edinburgh Royal Infirmary, Dr. T. Grainger Stewart concludes, in a paper read before the Edinburgh Medico-Chirurgical Society on July 5th, 1865, that acute hepatic atrophy is a blood disease operating independently on the different abdominal viscera. The following are the considerations which seem to this gentleman to point to such an explanation: (1) At the examination after death the blood was found dark and fluid, while the muscles were dry as they are in typhus fever and other blood diseases. (2) The spleen was soft and pulpy as it is in many febrile blood diseases. (3) The fact that the kidneys and the liver were affected by a peculiar and identical morbid process indicates that they were influenced by a common cause, that cause being situated in the blood and consisting of a form of fever poison. (4) The appearance, and amount, and effects of the exudation, being different from what is seen in simple inflammation either of the liver or kidneys, indicate that some peculiar

* A Clinical Treatise on Diseases of the Liver, vol i, p. 227. Translated by Dr. Murchison for the New Sydenham Society. London, 1860.

matter was present in the system altering the ordinary processes. (5) The facts that this disease occurs so often during pregnancy, and that it seems to be induced by depressing mental emotions, serve to show that it is of a constitutional origin. And then (6) from all these considerations Dr. Grainger Stewart thinks that we cannot avoid concluding that this peculiar affection is a blood disease; and that it leads to atrophy of the liver by diffuse exudation into the hepatic cells, which is followed by a rapid fatty degeneration.

Treatment.—Our ignorance of the primary nature of this disease, no less than its severity and rapid progress, must necessarily render the treatment empirical and almost useless. The favorite remedies are at first drastic purgatives, then the mineral acids, and subsequently diffusible stimulants as depression sets in. Ice may be freely given to check the vomiting. Where the diagnosis is doubtful, and especially where the distinction between acute atrophy and bilious fever remains uncertain, Frerichs recommends large doses of quinine dissolved in acids.

2. ACHOLIA FROM OTHER CAUSES.—Blood poisoning must arise from all diseases which produce complete disorganization of the liver; while it will usually be attended with jaundice, hemorrhages, delirium, coma, &c. On the other hand these symptoms are sometimes absent; for it has been rendered certain by the experiments which disease is constantly performing (as it were) for our instruction, that the constituents of the bile may be retained for a time in the blood without marked injury resulting.

The chief diseases which ultimately lead to destruction of the glandular epithelium, and consequently to complete arrest of the functions of the liver, are, cirrhosis, fatty degeneration, and extensive cancer; as well as those affections which produce an impermeable state of the ductus communis choledochus, or of the hepatic duct. In these cases it not uncommonly happens that severe indications of cerebral disturbance, quickly ending in fatal coma, are suddenly superadded to those other morbid symptoms which may have been long present.

3. CHRONIC ATROPHY OF THE LIVER.—This disease is in no way connected with acute atrophy. It results from all those conditions which tend to arrest the capillary circulation through the gland, and hence to lessen its nutrition.

The *causes* which diminish the size and functional activity of the liver are numerous. Great mischief can be originated by long-continued compression of the organ; such as may arise from tight lacing, extensive pleuritic effusion, great hypertrophy of the heart, constant distension of ascending and transverse colon, chronic peritonitis, &c. The various forms of adhesive inflammation, either of Glisson's capsule or of the parenchyma, occlusion of the hepatic capillaries, obliteration of the trunk of the portal vein, the development of new growths, the cicatrization of abscesses, &c., will also all tend to produce more or less serious and extensive atrophy.

The *symptoms* that ensue from a persistent defective secretion of bile are developed slowly and insidiously. At the commencement there is usually imperfect performance of the functions of digestion, flatulence, alternately diarrhœa and constipation, pale-colored stools, a dry sallow state of skin, and a falling off in flesh and strength. Then percussion shows that the dimensions of the liver are gradually lessening, so that sometimes there is scarcely any appreciable dulness. Of course, the digestive derangements lead to increasing debility; the patient, in the course of many months, be-

comes very anæmic and much wasted; and there will perhaps be fatal exhaustion, &c. Very frequently general dropsy sets in, which soon ends the suffering.

After death, the liver is found flabby and uneven on its surface with its capsule wrinkled; while it is either partially or wholly atrophied, according to the extent of the alterations which have been produced in the larger bloodvessels and biliary ducts. The hepatic cells in the portions of the gland affected are shrivelled up and much diminished in size, of a pale color, devoid of granular contents, and perhaps loaded with oil or particles of bile-pigment. The capillary vessels appear more or less impermeable, while the trunk and branches of the portal vein are often enlarged. More rarely, the portal vein or the hepatic artery is plugged up.

A carefully directed plan of *treatment*, when early commenced, can do much to prolong life. The diet should be light but nourishing; being free from rich dishes, sugar and fermented drinks. Warm clothing ought to be used, and overfatigue carefully guarded against. To aid digestion recourse may be had to pepsin (F. 420); or to the purified ox-bile with ammonia (F. 170); or to what has answered better in my hands, a daily dinner-pill of ipecacuanha with quinine or rhubarb (F. 44, 384, 385). To combat the anæmia in these cases, it appears to me more advisable to trust to bark and the mineral acids, rather than to ferruginous tonics; for the latter have sometimes seemed to give rise to hepatic congestion, and thus to have increased the mischief. This remark does not hold good, however, with regard to the waters of the various chalybeate springs, which will often be used with much advantage. Consequently we may send the invalid to Harrogate (F. 466), Spa in Belgium (F. 467), Kissingen in Bavaria (F. 493), or to Marienbad in Bohemia (F. 497). When dropsy has set in, diuretics are to be resorted to; the patients being generally too weak to bear the employment of drastic purgatives. If the ascitic fluid be excessive temporary relief must be afforded by paracentesis.

V. DEGENERATIONS OF THE LIVER.

1. FATTY DEGENERATION.—The hepatic cells in their normal state always contain a certain amount of oil; the degree varying with the nature of the food which has been digested. But in *fatty liver*, or *fatty degeneration of the liver*, the quantity is very much increased; so that the cells may be seen on a microscopic examination to be gorged with oil-globules which diminish the normal granular matter and quite obscure the nucleolated nuclei.

The *causes* of this form of hepatic enlargement are usually constitutional. It is a condition that is of frequent occurrence in pulmonary consumption; as well as in fatty degeneration of other important organs—like the heart, kidneys, &c. Persons who live too freely, who indulge in alcoholic drinks, and who lead indolent lives, frequently suffer from it. It has also been met with during the progress of cancer, and of constitutional syphilis; as well as after death from some acute diseases, such as ichorrhæmia, typhus, small-pox, erysipelas, &c. If we wished to produce a fatty liver, we could hardly take a better lesson than that which is taught by the poulterers of Strasbourg, who keep their geese in small cages, deprived of exercise, in a heated atmosphere, and with a large supply of carboniferous food.

With regard to the *pathology* of this affection it appears probable that the accumulation of fat (chiefly olein) takes place only in the secreting cells; there being no deposit in the intercellular spaces of the parenchyma. Frerichs reminds us that appearances are not unfrequently in favor of a deposition in the intercellular spaces, inasmuch as in preparing sections for microscopic examination a number of cells become destroyed, and their fatty contents escaping they appear to lie external to the cells. Unless the quantity of oil be considerable, it is often impossible to say that there is fatty degeneration without a minute examination. In the case of excessive degeneration, however, the gland is found of a dull yellow color; it may be increased in breadth but diminished in thickness; and it is generally greasy and soft and flabby. The weight of the liver either remains unaffected, or it will be slightly increased, or it may be much diminished. The cut surface usually presents a reticulated appearance; there being reddish-brown patches corresponding to the hepatic veins, and around them light yellow rings which are conformable with the periphery of the lobules—the region of the portal vein. This nutmeg-like appearance is not characteristic of fatty degeneration, however, since it may occur in hepatic congestion, &c.

According to Frerichs the alteration in the hepatic cells usually commences at the periphery of the lobules, in the region of the interlobular vessels belonging to the portal vein; while it gradually advances towards the centre of the lobules supplied by the hepatic veins. The process may be said to consist of three stages. In the first, the cells in the neighborhood of the ramifications of the portal vein become fatty: in the second, the degenerated cells extend more than halfway to the centre of the lobules: while in the third, similar cells are found as far as the central vein.

The general *symptoms* are often slight. The powers of life wane, but they do so gradually and silently. Unless there be considerable accumulation of fat in the hepatic cells, the functions of the liver are not deranged; so that there is neither pain, jaundice, nor dropsy. If the cells be much loaded, however, they may impede the circulation of blood in the capillaries, as well as obstruct the excretion of bile. Under these circumstances gastric catarrh, indigestion, a sense of weight and fulness in the right hypochondrium, a pasty complexion, a smooth and waxy-looking state of the integuments, sometimes constipation or occasionally diarrhœa with pale clay-colored stools, anæmia, hæmorrhoids, possibly ascites, and even fatal exhaustion or complete acholia, may result. But it is very seldom that there are these serious symptoms; perhaps because the primary systemic disorder proves fatal before there is time for their occurrence.

The *treatment* of fatty liver when it occurs as a secondary affection scarcely requires consideration, seeing that it can be of comparatively slight importance where there is phthisis, fatty degeneration of the muscular fibres of the heart, cancer, syphilis, &c. But if this hepatic disease should be diagnosed as the sole affection of the system (which is very rarely accomplished), its cure ought to be attempted; while as we have merely to free the hepatic cells of their excess of fat, the minute elements of the liver not being disorganized, there is every reason to hope for success. The most important remedy is the regulation of the diet; alcoholic drinks, sugar, amylaceous matters and fat, being interdicted. A large proportion of plainly cooked animal food may be allowed, with a moderate allowance of fresh fruits, &c. Torpidity of the bowels is to be overcome by active exercise in the open air; as well as by rhubarb or sulphate of soda, or by the use of the waters of Carlsbad, Pullna, Kissingen, &c. The remedies from

which the best results may be expected are the various preparations of iron, chloride of ammonium, chlorate of potash, and (where there is any suspicion of a syphilitic taint) the iodide of potassium; but should either of these drugs appear to induce debility, or to destroy the powers of the stomach, or to take away the appetite, they must be exchanged for bitter vegetable substances.

2. AMYLOID DEGENERATION.—This structural disease of the liver does not demand much attention in this place, since its pathology has already (p. 159) been treated of with as much latitude as the present extent of our knowledge will allow.

The important condition known as amyloid degeneration (the *waxy, albuminous, lardaceous*, or *scrofulous liver*) can coexist with fatty liver, or with cirrhotic induration, or with syphilitic cicatrices and gummatous nodules, or it may alone be present. In it the coats of the small blood-vessels are first affected; and then the glandular structure of the organ is gradually converted into a dense material. Hence results destruction of the gland-cells, with abolition of their functions. The liver is found after death much increased in weight and size, so that instead of weighing from three to four pounds avoirdupois, it may average eight or nine. Its substance is also tough and somewhat resembles yellow wax, and the cut surface presents only faint traces of lobules. Minutely examined the cells are found compressed, irregular in form, and with their nuclei atrophied.

This peculiar state of the liver occurs in phthisis much more rarely than fatty liver does; with which, however, it has been sometimes confounded when in an early stage. It is frequently met with in the subjects of constitutional syphilis, even when the osseous system is healthy. But it is perhaps most commonly found in young male adults who have long suffered from protracted suppuration owing to scrofulous or other forms of caries of the bones, whence it was at one time thought to be peculiar to this disease. The infiltration, or degeneration, takes place insidiously; the first indication of its existence being in the increased size of the gland. The biliary secretion lessens as the cells degenerate. Then the circulation gets impeded, as well as the escape of bile from the ducts; so that the superficial veins of the abdomen enlarge, a small quantity of fluid collects in the peritoneum, anæmia to a marked degree sets in, the countenance presents a peculiar dusky sallow hue, while occasionally the skin and conjunctivæ become of a decided yellow tinge. As the enlargement of the liver progresses, so the general health and strength decidedly deteriorate. Various complications also occur, the chief of these being a troublesome persistent diarrhœa, attacks of nausea and retching, loss of appetite, transient attacks of fever, a tendency to inflammation of internal organs, and general irritability with insomnia. Should anasarca set in, with the accumulation of fluid in the peritoneum, there will follow at no long interval emaciation and exhaustion and death.

The disease being constitutional, its ravages are by no means limited to the liver. The spleen and kidneys are likewise very generally involved in the morbid process; while sometimes the lymphatic glands, as well as the gastro-intestinal mucous membrane, are also affected. The renal disorder is more serious and fatal than the hepatic, its existence being rendered certain by gradually increasing bad health, together with the persistent presence of albumen in the urine, as well as of transparent waxy-looking casts of the secreting tubules.

On the subject of treatment, it need only be remarked that disappointment has hitherto followed almost all attempts at cure. The disease slowly

but steadily advances to a fatal termination. If any good can be done, it is by the use of remedies directed to the relief of the cause. Thus, if there be constitutional syphilis, iodide of potassium or iodide of iron should be employed, or the tincture of iodine alone, with the use of iodine ointment to the abdominal walls, may be deserving of trial. In some instances benefit has temporarily accrued from the employment of iron, especially the perchloride, or from the nitro-muriatic acid and bitter tinctures. Then any suppurative affection ought to be cured; while if there be disease of the bones surgical interference can perhaps be of some avail. In all cases attempts are to be made to prevent the occurrence of complications, as well as to relieve the prominent symptoms. The general health must be attended to, while the system is to be supported by regulated quantities of good wine, by breathing a pure atmosphere, by warm or tepid sea-water baths, and by easily digested nourishing food.

3. THE PIGMENT-LIVER.—After death from severe intermittent, remittent, or continued fevers, the liver is sometimes found to present a blackish or chocolate color, brown insulated figures being observed upon a dark ground. The cause, &c., of this change of color has been particularly examined by Frerichs, who says that it is due to the accumulation of pigment-matter in the vascular apparatus of the gland. On magnifying fine sections of the hardened tissue, accumulations of pigment are to be seen in the capillary network of the portal and hepatic veins, while the branches of the hepatic artery also contain quantities of black coloring matter. The same melanotic material may often also be found in the parenchyma of the spleen; while the kidneys, brain, and other organs are less constantly implicated. The pigment is carried to the tissues by the blood, and if this fluid be minutely examined it will be seen to contain small granular masses, together with nucleated pigment-cells having black granules in their interior. It is generally believed that the melanotic matter is formed in the spleen, owing to stagnation of the blood in the venous sinuses, arising from the intense congestions which affect this organ during the course of all malarious fevers.

The chief consequence of this pigment formation is an impediment to the circulation of the blood through the liver, so that the gland at first becomes congested, and subsequently atrophied. The non-arrest of particles of the pigment as they circulate through the liver and lungs, allows them to be carried to the brain, in the narrow capillaries of which they accumulate, where they may subsequently induce severe cerebral disturbance.

The occurrence of this condition shows how necessary it is to cure all diseases dependent upon marsh miasmata as quickly as possible, lest the capillaries of the liver get loaded with melanotic matter, leading to their destruction, and of course to atrophy of the gland. When the latter is established (as indicated by gastric catarrh, a grayish-yellow color of the skin, nausea and diarrhœa, and severe cerebral symptoms or ascites) it will be too late to hope for benefit from the employment of quinine or any other drugs.

VI. HEPATIC TUMORS.

The most significant new formations which have their seat in the liver are the hydatid tumors and cancerous infiltrations. There are, however, two or three other growths occasionally met with, but they are of so little importance that they only require a very brief notice.

1. CYSTIC TUMORS OF THE LIVER.—Encysted knotty tumors, containing a cheese-like substance, have been described by Dr. Budd. They are found in the substance of the gland, varying in bulk from the size of a large pea to that of a small potato; they are of a white or pale yellowish color, and they have a nodulous form. A minute examination shows that the steatomatous-looking matter is composed of a mass of irregular granules and free oil-globules, while occasionally a few plates of cholesterin can be discovered. These tubera appear to have their origin in inflammation of the mucous lining of the hepatic ducts, in consequence of which morbid process a duct becomes closed at some point, so that no outlet remains for its secretions. The latter therefore accumulate, dilate the affected canal, and at length form the unorganized cheese-like matter.

Sacculated pouches or cysts, containing a glairy fluid, are formed in the same manner as the knotty tumors. Cruveilhier has reported a case where the liver must have been crowded with these irregular cavities, each containing mucus more or less tinged with bile. The signs of pre-existent hepatitis were distinct. The patient died from exhaustion, his chief symptoms having been jaundice and daily increasing debility.

Simple serous cysts, with clear watery contents, are sometimes found scattered through the liver. They are seldom much larger than small beans, are lined with tessellated epithelium, and they have not seemed to have any connection with the bile-ducts. In several instances coexisting cysts have been discovered in the kidneys.

2. CAVERNOUS TUMORS OF THE LIVER.—These tumors are not uncommonly found on the upper surface of the liver, especially in the bodies of aged persons. They are developed in the hypertrophied connective tissue. On looking at the gland, one or more dark-blue colored and irregular spaces are seen, varying in size from that of a pea to that of a common hen's egg, on cutting into which a tissue is found resembling that of the corpora cavernosa of the penis, containing a quantity of dark blood. According to Rokitansky a connection can always be traced between the latter and some of the branches of the portal vein, while the structures will be found prominent or collapsed according to the amount of blood contained in their compartments. So far as our experience at present goes, these cavernous vascular spaces give rise to neither local nor general disturbance.

3. TUBERCULOSIS OF THE LIVER.—Tubercular deposits are very rarely discovered in the liver, and probably never as a primary disease. Where they have been found, it has been in connection with far-advanced tuberculosis of other organs, especially of the abdominal viscera. Hepatic tubercle occurs over all the portions of the gland, in the shape of semi-transparent miliary granules, or as yellow adipose deposits, the patient generally succumbing to the constitutional affection before there has been time for the stage of softening to set in. Still, small vomicæ do occasionally form, and then care will be required to distinguish them from a morbid dilatation of the gall-ducts. Rokitansky* states that this latter condition is almost invariably met with in combination with hepatic tubercle, and is not unfrequently coexistent with tubercular disease of other organs. These dilatations or cavities are of the size of a millet-seed or of a pea, with flaccid parietes; they are filled with viscid, muco-bilious dirty-green matter;

* A Manual of Pathological Anatomy. Vol. ii, p. 150. Translated by Dr. Sieveking for the Sydenham Society. London, 1849.

they are scattered throughout the liver, and they consist of swollen capillary gall-ducts. The hepatic tubercles exist at the same time and at various distances from the cavities; occasionally a tubercle will be found near one of the latter, but it is not characterized by the symptoms of secondary deposit accompanying the fusion of tubercular matter.

4. HYDATID TUMORS OF THE LIVER.—Hydatid [from Ὑδατίς = a vesicle] tumors occur in the liver more frequently than in any other organ. They are occasionally met with, however, in the subperitoneal connective tissue, the spleen, the omentum, the muscles of the heart, the brain, the kidneys, the lungs, and in the bones—particularly the tibia.

Pathology.—These growths consist of a sac, formed by the condensation of surrounding tissue, lined by a thin bladder or cyst, and filled with a limpid and colorless salt fluid; floating in which numerous small cysts similar to that lining the sac, and varying in their measurements from the size of a small seed to that of a fowl's egg, will usually be found. To these cysts or bladders Laennec gave the name of acephalocysts—bladders without heads [Ἀ = priv. + κεφαλή = the head; and κύστις = a bladder]. The acephalocyst lining the sac is composed of several finely laminated and friable coats possessing the firmness of coagulated albumen. Sometimes this parent cyst contains no floating hydatids, or very few; in other cases it is literally crammed with them; and these again, it is said, may contain a third, and the latter even a fourth generation. To distinguish these different kinds, as well as to mark the mode of their increase, naturalists have divided these productions into two species: 1st, the *acephalocystis endogena* of Kuhn—likewise called *socialis vel prolifera* by Cruveilhier, the *pill-box hydatid* of Hunter—which is the kind most commonly developed in the human subject, and in which the fissiparous process of generation takes place usually from the internal surface of the parent cyst, the progeny being sometimes successively included; and, 2d, the *acephalocystis exogena* of Kuhn—*eremita vel sterilis* of Cruveilhier—which develops its progeny generally from the external surface, and is found in the ox and other domestic animals. The true nature of these bodies is no longer doubtful. When an acephalocyst is opened, its inner surface is seen to be studded with numerous little elevated opaque spots or granules; which buds or offsets, on being carefully scraped away and minutely examined, will be found to consist of *Echinococci* [Ἐχῖνος = the hedgehog + κόκκος = a berry], from the cylinder of hooks surrounding the head. The fluid of the cyst also contains echinococci, which can be obtained from the sediment after subsidence has taken place in a conical glass; inasmuch as they are developed in groups on the inner wall of the hydatid vesicles, many subsequently becoming detached and dying.

The relation of hydatids to tapeworms has only been clearly made out within the last few years. But it is now certain that echinococci are merely the progeny of a minute tapeworm, in a special stage of development,—in short, they are the larval conditions of the Tænia echinococcus of the dog and wolf, a worm about four lines in length, provided with a head having four suckers and a circle of hooks. Consequently, "whilst the mature worm has thus a very limited territory for its place of residence, its peculiar larvæ, on the other hand, are found dwelling in a great variety of animals. Amongst the bearers are men, monkeys, sheep, oxen, deer, camels, the giraffe, and other ruminants; also the horse, ass, zebra, several feline animals, and perhaps the squirrel."* This immature tapeworm—the scolex

* Entozoa: an Introduction to the Study of Helminthology, &c. By T. Spencer Cobbold, M.D., &c., p. 261. London, 1864.

of the Tænia echinococcus—is a transparent, colorless, oval-shaped worm, displaying an apparatus of suctoria arrangement with hooklets at the cephalic extremity; and measuring about the one-two-hundredth of an inch in length, and rather less in breadth. In structure, the parasite is a mere integument; the head and neck, which are equivalent to one half, being susceptible of retraction into the other half. The head is a flat disk at the extremity of the neck, having imbedded in its substance an apparatus of small hooks, thirty-four in number, disposed in a circle. Immediately behind this head are the four rounded suctorial processes, beyond which follows the body; while at the extremity of this is a short pedicle by which the animal attaches itself to the wall of the cephalocyst. When the animal is viewed with its head retracted, the circle of hooks is seen through the transparent integument, appearing like a ring in the centre of the body.*

Symptoms.—When a hydatid tumor forms in the liver, its growth is generally slow. For a considerable period it may cause little inconvenience beyond a sensation of weight: so that, not unfrequently, the disease is found after death, where there has been no suspicion of its presence during life. Fever, pain, jaundice, anæmia, and dropsy, for a period, are only accidental complications. When the cyst approaches the surface, it may then be easily felt; while the volume of the tumor increases. Fluctuation cannot always be easily made out; but a peculiar vibratory sound (hydatid fremitus) be obtained save in extreme cases. If the cyst inflames and suppurates, violent pains result. When it has attained a great size it will perhaps compress the portal vein, and produce ascites and œdema of the legs. It may burst, and by setting up peritonitis, which is not necessarily fatal, empty itself into the abdominal cavity; or even into the sac of the pericardium, producing sudden death. Now and then a communication has been established with the hepatic duct—whence the contents of the cyst have passed into the common duct into the duodenum; or the cyst has opened into the intestines, or in a contrary direction through the abdominal walls. In the three latter cases, the contents will often be entirely discharged, and the sac ultimately closing up will leave the patient well. When the tumor bulges into the thorax it interferes with the proper performance of the functions of the lungs and heart, and it may burst into the pleural cavity. If it open into the base of the lung, or into one of the bronchi, the patient becomes so worn out with the constant expectoration of hydatids and purulent matter, while the constitutional disturbance is so severe, that he generally sinks under the mischief. Suppuration of the cyst and fatal pyæmia is not a very infrequent termination.

Sometimes a hydatid tumor gets well without opening; this happens most frequently by the absorption of the fluid contents, and subsequently the secretion of a thick and putty-like matter within its sac. Whether this secretion result from the death of the hydatids, or whether it be the cause of their destruction, is uncertain. The first view, however, is the most reasonable one.

The echinococcus disease is endemic in Iceland; so that, according to Leuckart, the practitioners (few in number) not unfrequently have cases of 100 cases under treatment at the same time, while it is the cause of nearly one-sixth of the total number of deaths. Although this may be an exaggerated estimate, yet without doubt the disease is common

* Erasmus Wilson on the Echinococcus Hominis. Medico-Chirurgical Transactions, vol. xxviii, p. 26, &c. London, 1845.

almost to constitute a plague. For every 100 Icelanders there are 1100 head of horned cattle, while every peasant has on the average six dogs; which dogs have constant access to the water used by their masters for drinking, &c. The ova of the tænia echinococcus are thus swallowed by the human subjects; and passing from the stomach or bowel into the liver, undergo development there.

Diagnosis.—When a large hydatid tumor occupies the right hypochondrium, it need not necessarily be situated in the liver; for it may have its origin in the omentum, or in the subperitoneal areolar tissue, or in the right kidney. One of the largest tumors of this kind that I ever saw was diagnosed during life as arising from the liver; but it was found after death to be seated in the omentum. In the same way, when the tumor fills the left half of the abdomen chiefly, it will often be difficult to say whether it is connected with the spleen, omentum, or left kidney.

From time to time cases of more than ordinary difficulty, as regards diagnosis, are met with. This is especially true when the tumor is so large as to extend low down into the pelvis. Thus, an enormous hepatic tumor has been mistaken for a bony growth from the promontory of the sacrum, obstructing labor at the full time. As delivery by the natural passages seemed to be impossible, the Cæsarean section was performed by Dr. Sadler; the patient dying a few hours afterwards. At the necroscopy, the obstructing cause was found to consist of an immense hydatid tumor; which not only occupied the whole upper part of the abdomen, but extended downwards to the pelvis, where it had been so compressed by the uterus as to assume a bony consistence.* In another remarkable instance the abdomen was opened by Mr. Thomas Smith to extract a supposed unilocular ovarian cyst. The disease was found to consist, however, of a large hydatid tumor of hepatic origin. Fortunately the patient recovered completely.†

Treatment.—Several agents have been supposed to possess the power of stopping the growth of hydatid tumors. The chief of these are iodide of potassium, calomel, and common salt: sulphur baths and electricity have also been employed. Most observers now agree that little benefit is derived from such remedies. But I confess that my faith in the power of full doses of iodide of potassium to cause absorption of the fluid portion of the cysts, and thus to insure the destruction of the hydatids, has been greater than that of most other physicians. And indeed, I should speak more strongly upon this point, were it not for the exceeding difficulty of estimating the value of any drug from its employment in a limited number of cases; a difficulty which is increased when it has to be allowed that the action of the medicine is not uniformly favorable. Now there can be no doubt that the iodide does frequently fail to effect any good in the disease under consideration. Nevertheless, in some instances patients have expressed themselves as feeling much relieved by this medicine; and in two cases of well-marked hepatic tumor recovery ensued while it was being taken. As one of these subsequently died after parturition, the diagnosis of hydatid disease was verified.‡ The second patient remains well.

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* The Medical Times and Gazette, p. 141. London, August 6th, 1864.

† The British Medical Journal, p. 97. London, February 1st, 1868.

‡ While the fifth edition of this work was printing (January, 1865), the death of this patient took place. Her history, interesting in more respects than one, is as follows: Mrs. D., ætat. 24, fair complexion, slender and delicate, came under my care on December 19th, 1862. She says she has been married twelve months: never been pregnant: catamenia irregular. Is suffering from a large swelling occupying the right side of the upper part of the stomach, which was first detected very shortly after her marriage. Has been under the care of Dr. Budd, at whose suggestion Mr. Hulke passed a fine trocar and canula into the front part of the liver. This was

When the tumor is large, is increasing in size, and is productive of distress ith general derangement of the health, surgical interference is called for. he operation may consist of simple tapping; or of a careful incision, when e are sure that the cyst is firmly adherent to the integuments;* or of ,pping, with the injection of a solution of iodine, or of diluted alcohol, or semifluid extract of male-fern; or, of the opening of the echinococcus ,c by the repeated use of caustic (Vienna paste). As a rule, the removal the limpid colorless fluid by tapping (using a very fine trocar) suffices r the destruction of the scolices; the latter often perishing when subjected pressure, owing to the abstraction of the fluid contents of the parent cyst. he scolices, either free or attached to the vesicles, as well as detached ooklets, at times come away through the canula, when a larger instrument ıan that just recommended is used; but they need not necessarily be dis-

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ne early in the spring of 1862, but no fluid came away, and she felt no inconveni- ıce from the operation. On examination I found a large solid mass (apparently ade up of the liver in front and some foreign structure behind), occupying a large ortion of the right side of the abdomen, pushing up the diaphragm, and encroach- g considerably on the right side of the chest. No fluctuation or hydatid fremitus uld be detected. She suffered from shortness of breathing, attacks of palpitation ıd faintness, and was weak, &c. My diagnosis was,—a large hydatid tumor of the ver; and it was afterwards learned that this was Dr. Budd's view of the case. She as ordered a very nutritious diet, and a mixture containing three grains of iodide potassium, with ammonia and bark, three times a day. As there was also con- ant pain in the side, a belladonna liniment was prescribed.

This patient generally saw me once a week for several months after her first appli- ıtion. She steadily improved; the liniment was soon left off; and then cod-liver il was ordered to be taken once, and subsequently twice a day. During the whole me the iodide of potassium was continued, but in diminished doses. On April)th, 1864, my note runs thus: "Cured. Is becoming quite stout. She is probably bout two months advanced in her first pregnancy. To discontinue all treatment." n December 18th, 1864, Mr. Tyler delivered her of a live child, after a tedious ıbor of 48 hours. She recovered from this pretty well, but did not appear to get p her strength. There was no other unfavorable symptom. On the morning of anuary 6th, 1865, she sat up to pass water, suddenly complained of feeling very ıint, rallied for a minute or two, and immediately fell back dead.

Thirty hours afterwards an examination of the body was made; Mr. Tyler, Mr. ampbell de Morgan, and myself being present. The cause of death, as had been ırmised, was a clot obstructing the pulmonary artery. On reflecting the abdomi- al walls, the liver looked large yet very healthy: but on removing this gland from s bed a tumor was found in the posterior part, about the size of a cocoanut de- rived of all shell. On cutting into the growth, it was seen to be completely filled ith dead hydatids, somewhat resembling soddened pieces of dirty wash-leather. here was not a drop of fluid in the parent, or in the contained cysts; while many f the latter must have been at least as large as a fowl's egg when they were living.

* Owing to an error in diagnosis I have cut down upon a hydatid cyst where there ave been no adhesions; recovery from the operation happily occurring. The atient was a married woman, 37 years old, who had had five children and three bortions; and whose last labor took place at the beginning of 1867. In February, 868, she applied to me for the relief of a painful swelling just below the ensiform artilage. On examination, it seemed certain that there existed a cystic growth; ut the conclusion I came to was, that in all probability the disease had its seat in ıe abdominal wall. As the tumor became more and more painful I determined to scertain its exact nature, and to remove it if possible. Dr. Percy Boulton admin- ıtered the chloroform and ether vapor on April 28th, and I gradually cut down pon the cyst until the cavity of the peritoneum was opened and the tumor seen to e seated in what looked like healthy liver. On opening this tumor, about a wine- lassful of hydatids escaped, the beautiful semi-transparent cysts varying in size rom a filbert to a large pin's head. The constitutional disturbance, subsequently, ras very slight; and in about three weeks she was able to return home from her ondon lodgings. I have not seen her since June 26th, when she came some eight iles to show herself. The interval since the operation was too short to enable me o speak as to the reality of the apparent cure.

charged. In the event of a cure not resulting from the first operation, it will possibly be desirable to repeat it with a trocar and canula as large as a No. 10 catheter; and then, perhaps, to pass an india-rubber drainage-tube through the puncture, so as to draw off the secretion as fast as it is formed, and thus to insure the ultimate contraction and obliteration of the cyst. This proceeding is only advisable, however, where the cystic tumor is adherent to the abdominal walls.

5. CANCER OF THE LIVER.—Every form of cancer, not even excepting the gelatiniform or colloid variety, has been met with in the liver. Of the two most frequent kinds, medullary or soft cancer appears to be more common than the scirrhous or hard variety. The disease may invade any part of the gland, either as a primary or as a secondary disorder. Probably in one-twelfth of all cases of cancer the liver is affected.

Pathology.—Hepatic cancer commonly takes the form of distinct and well-defined masses implanted in different parts of the gland; or in some exceptional instances, portions of the liver may be infiltrated with cancerous matter, the diseased segments merging insensibly into the healthy tissue without any distinct line of demarcation. In the first case, the nodules usually vary in bulk from the size of a pea to that of an orange, though they are sometimes much larger; while the smaller they are, the more abundantly do they stud the organ. Frequently they present an appearance as if spherical masses of firm lard were imbedded in the parenchyma; though in scirrhus their consistence may be as great as that of cartilage. Very rarely is there a well-defined capsule. Occasionally there is hemorrhage into the cancerous stroma; which, if abundant, may produce rupture of the serous covering of the liver, and cause sudden death. The portal vein and its branches are much more commonly implicated in the disease than the hepatic venous vessels; the lymphatic glands and vessels are often involved, and the bile-ducts may be compressed or obliterated.

With regard to infiltrated cancer it is only necessary to say that it seldom occurs without the nodulated form being likewise present, and that extravasations of blood and bile are often found in its structure. In both forms the hepatic cells in the neighborhood of the disease are usually discovered in a state of fatty degeneration.

Symptoms.—When a liver contains numerous masses of cancer, we shall find (in addition to the general indications of malignant disease) that it is generally much enlarged, extending far below the false ribs, even to the brim of the pelvis; while its regular form is lost, and uneven bulging prominences can be detected on the surface. The nodulous masses do not give rise to inflammation of the hepatic tissue; but when superficial they often cause peritonitis, which is generally very partial and of the adhesive kind, so that after death the tumors are found adherent to the diaphragm or to the abdominal walls. The remaining symptoms are somewhat obscure; loss of flesh and strength, constant diffused pain and tenderness, disorder of the digestive organs, and great irritability with mental depression, being generally the most prominent. Jaundice occurs more frequently than ascites; while in about one-fifth of all the cases both these conditions will be combined. The formation of gallstones not unfrequently adds to the suffering. The duration of hepatic cancer, except in the case of scirrhus, is usually short; life sometimes closing within six months from the first appearance of the symptoms, while it is very seldom prolonged for two years.

Where the disease presses upon the common duct so as to render it impermeable, the gall-bladder may become greatly distended. In one in-

stance it thus acquired the size of the fœtal head. The liver itself also gets swollen from biliary congestion.

Causes.—Malignant disease of the liver is for the most part a secondary affection; that is to say, it results from the transfer of cancer-cells by lymphatics and veins from the breast, stomach, kidney, &c. When primary, it does not occur before the age of thirty-five; while though it frequently spreads to contiguous organs, it only rarely contaminates remote structures.

Treatment.—Our remedies can only be palliative; such drugs as calomel, corrosive sublimate, iodine, and arsenic, only serving to impoverish the blood, and to hasten the fatal termination. Relief to the pain must be given by sedatives—especially by conium and belladonna; while the digestive organs should be strengthened by mild tonics, and a light nourishing diet. The action of opium is seldom favorable in hepatic cancer.

VII. DISEASES OF THE BILIARY PASSAGES.

Under this head we have to consider those diseases which affect the biliary ducts, from their commencement in the glandular parenchyma, to their termination in the duodenum; so that this section comprehends the disorders of the hepatic duct and its capillary branches, the cystic duct, the ductus communis choledochus, and the gall-bladder. The diseases of these passages give rise to important symptoms in proportion to the extent to which they impede the flow of bile from the liver, and the degree in which the hepatic parenchyma is involved in the morbid process.

1. INFLAMMATION OF THE BILIARY PASSAGES.—The biliary ducts and gall-bladder are now and then attacked by different forms of inflammation. Thus, there may be *catarrhal* inflammation; in which (as in similar affections of other mucous membranes) the secretion of mucus is increased, while it is also altered in quality, becoming viscid or mucopurulent. Occasionally the cystic or the common duct will thus become obstructed with a firm plug of mucus; but as the latter does not get organized, it is carried onwards or breaks up after a time, so that the excretion of bile is again rendered free. The lining membrane of the capillary ducts may also be thickened by catarrhal inflammation; their diminished calibre leading to retention of the secretion, and consequently to dilatation. This disease generally has its origin in catarrh of the stomach and duodenum; the extension of it to the gland taking place through the common duct. In *exudative* or *plastic* inflammation, there is either a firm fibrinous or a croupal product. This forms casts of the tubes, blocking them up and leading to their dilatation. To find these exudations is a very exceptional event. Nevertheless, they have been met with after death from typhus, erysipelas, pyæmia, cholera, &c. And then, the biliary passages are prone to suffer from *suppurative* inflammation, leading to the secretion of pus and a thick kind of mucus tinged with bile. Where the abnormal action is of long continuance, ulceration may be set up. Ulceration of the gall-bladder is often found when this reservoir is irritated by one or more gallstones; the concretion and the ulceration not always standing in the relation of cause and effect, because both may originate at the same time from an unhealthy condition of the bile. Moreover, the mischief set up by decomposing bile will possibly induce ulceration without any concretion being formed.

Inflammation of the mucous membrane of the biliary passages gives rise to *symptoms* of very variable severity. The gall-bladder, cystic duct, and common ducts are more obnoxious to this morbid action than the hepatic ducts; since the latter are less likely to be irritated by gallstones and unhealthy conditions of the bile. When there is merely catarrhal inflammation we find slight tenderness, tightness about the epigastric and right hypochondriac regions, nausea, a sluggish action of the bowels, mild fever, and jaundice—if the mucus secreted be sufficiently viscid and abundant to choke up many of the ducts; the symptoms ending in a beneficial attack of diarrhœa as soon as the pent-up bile finds its way into the duodenum. Supposing, from any cause, the bile is unduly retained in its natural reservoir, there is a risk of its decomposing and giving rise to much irritation and inflammation; which processes, as already mentioned, are very likely to end in suppuration and ulceration. In such cases the inflammation will be localized in the gall-bladder, or it is not unlikely to extend from this structure to the cystic and common ducts. Ulceration of these parts can also arise from the irritation of biliary calculi, and from defective nutrition of the system; while it has been found by several observers after death from remittent fever. The immediate consequences may be perforation, effusion of bile into the abdominal cavity, and fatal peritonitis: or, if adhesive inflammation have previously occurred, abscess will perhaps result and open into the bowel or externally; or closure of the cystic duct may follow, rendering the gall-bladder useless and causing the bile to flow continuously into the duodenum, often without giving rise to any marked results. The case is very different in the latter respect when there is permanent closure of the common duct; inasmuch as this occurrence leads to the gradual destruction of the hepatic cells, to atrophy of the capillary bloodvessels, and to a complete wasting of the lobular substance. Some remarkable cases have been recorded where the patients have thus lived for several months after there has ceased to be any discharge of bile from the liver, since none could be secreted; and in which there has been deep and persistent jaundice, attacks of gastric or intestinal hemorrhage, wasting with hectic fever, and sometimes constipation alternating with diarrhœa. Death has occurred from gradually increasing exhaustion; and, strange to say, without the occurrence of any cerebral disturbance.

The biliary passages may all become dilated, from their origin in that plexiform network in which the hepatic cells lie, to the termination of the common excretory duct of the liver and gall-bladder in the duodenum. Generally speaking, the expansion is only partial. In either case, it can arise from the habitual accumulation of inspissated bile; from compression of the ducts by tumors or disease of the parenchyma; from inflammatory swelling of the mucous lining diminishing the calibre of the tubes, and so leading to the retention of their secretions as well as of the bile; and from obstruction by calculi, catarrhal or croupy exudations, &c. Owing to obstruction of the duodenal orifice, the ductus communis choledochus has been found enlarged to the diameter of the small intestine. When the gall-bladder is unable to get rid of its contents in consequence of occlusion of the cystic duct, the residuary bile may be absorbed; but if the lining membrane continues to secrete mucus, dropsy of the cyst will result from the accumulation. Moreover, if the obstructing substance act at all like a valve—permitting the ingress of bile but preventing egress, a large pear-shaped or globular tumor may be found, containing some pints of fluid. Under these circumstances, rupture of the bladder has been prevented by tapping; an operation which can be safely performed provided there are adhesions to the abdominal wall.

With regard to the *treatment* of inflammation of the biliary passages there seems to be considerable confusion. The application of leeches over the right hypochondrium is regarded as absolutely necessary by some authorities; but it is difficult to understand how "local depletion" in such an organ as the liver can be effected, unless indeed there has been extensive adhesive inflammation of the visceral and parietal layers of the peritoneum. The efficacy of blisters, when the leeches have subdued the pain and fever, is said to be great. Nevertheless, it is excusable to doubt the possibility of our power to reduce increased action in the liver, by augmenting the tissue changes in a limited portion of the abdominal walls. And again, the administration of mercury is strongly recommended to increase the quantity of bile; although, if there be one principle in medicine which ought more constantly to be borne in mind than another, it is that an organ inflamed to a greater or less extent should be rested as completely as possible. In all probability the truth is, that we cannot control these inflammations by active remedies; and he will prove the best physician who is content to put his patients in the most favorable condition for allowing them to pass through the several stages of the disease, without complicating the action by a line of treatment of which we cannot give a rational explanation. The incurable cases will run their course, in spite of all that may be done. On the contrary, those examples that naturally end in recovery can be best aided in their progress by rest, a restricted diet, and warm baths; with simple aperients if there be constipation, or conversely with astringents. Where there is much pain, fomentations and sedatives will relieve it; if there be fever and thirst, simple diluents are to be freely allowed; while as soon as exhaustion sets in, it must be combated by easily digested restorative food, and ammonia with bark, &c. Supposing we could feel certain that the obstruction was due to a portion of inspissated mucus, an emetic might drive the tenacious plug onwards. In those cases where the catarrhal inflammation becomes chronic, and where some few months elapse without the customary discharge of bile freely returning, the employment of the nitro-hydrochloric acid (F. 378), or a visit to one of the mineral springs had better be recommended. The waters of most service are those of Carlsbad (F. 496), Marienbad (F. 497), Kissingen (F. 493), and the like.

2. ENTOZOA IN THE BILIARY PASSAGES.—The proper habitat of the *Ascaris lumbricoides* is the small intestine. But every now and then this worm migrates upwards into the stomach, or downwards into the colon and rectum. Moreover, it may perforate the abdominal walls. Consequently it is not surprising, that in a few instances a lumbricus has found its way, by the duodenal orifice of the ductus communis choledochus, into the gall-bladder or up the branches of the hepatic ducts; a journey which it would more easily accomplish, if the opening were stretched by the previous passage of a calculus or hydatid. The consequence has been very considerable irritation of the ducts, as well as obstruction to the flow of bile. Cases of fatal jaundice have occurred from the blocking up of the common duct by a large round worm; rupture of the duct has taken place from the same cause; while if this helminth passes into the branches of the hepatic duct it may not only impede the flow of bile, but set up catarrhal or exudative inflammation, dilatation, and perhaps rupture of the duct, ulceration, or suppuration. Lobstein found a gallstone in the common duct, the nucleus of which was composed of a round worm.

The *Distoma hepaticum* (more correctly, the *Fasciola hepatica*), familiarly known as the liver-fluke, is a flat trematode helminth, rather more or less

than an inch in length, and about half an inch broad. It has a perforated oral and an imperfect ventral sucker—the latter serving as "an anchor or holdfast," while both are employed as organs of locomotion. The oral disk also assists as "a prehensile organ for taking in the biliary secretion on which the animal feeds," whilst the pharyngeal sphincter prevents the regurgitation of food after it has distended the stomachal passages (Cobbold). The œsophagus is short; it ends in two primary intestinal divisions, which in their course give off numerous secondary branches, and these again subdivide; all these tubes terminating in blind cæcal extremities. The male and female generative organs are placed in the same individual.

The Distoma hepaticum is the pest of grazing cattle when they are confined to marshy or wet grounds. With sheep it produces the disease called the *rot;* in which affection the liver is sometimes found containing several hundred flukes. It has been estimated that upwards of one million sheep and lambs die annually in this country from the rot, some of the epidemics being much more severe than others. This entozoon has been very rarely found in the human subject. Mr. Partridge obtained one from the gall-bladder of a patient who died at the Middlesex Hospital, which Professor Owen considered was in no respect different to the Distoma hepaticum of the sheep. M. Duval also discovered several in the portal vein (see p. 62), and other instances have been reported. As the presence of this fluke in man has never been diagnosed during life, no treatment has been adopted. In sheep, the severe effects of the rot seem to admit of palliation by removing the animals to dry ground, feeding them on beans and peas, &c., and by the free administration of common salt.

The *Distoma lanceolatum* is much smaller than the Fasciola hepatica, measuring only the third of an inch in length and about one line and a half in breadth. Instead of being rounded at each end, like the latter, it has a lanceolate form, the caudal being more obtuse than the oral extremity. It has two suckers. The œsophagus divides into two blind and non-branching intestinal tubes; moreover, each individual has male organs, as well as ovaria and oviducts and a long uterine canal. This species is found in the liver of the ox and sheep, but less frequently than the Fasciola hepatica.

Only three instances are known where the Distoma lanceolatum has been detected in the human subject. Bucholz obtained several from the gall-bladder of a prisoner who died of typhus at Weimar. Chabert found a large number in the stools of a girl, which were expelled after a dose of empyreumatic oil. And Dr. Kichner, of Kaplitz, in Bohemia, met with the case of a young girl who died after suffering pain in the liver for some years, and whose gall-bladder contained eight calculi with forty-seven specimens of this small trematode helminth. The liver of this patient weighed eleven pounds.

3. GALLSTONES.—These concretions are more frequently formed in the gall-bladder than in the substance of the liver—in the branches of the hepatic duct. Solitary calculi, when found in the gall-bladder, are globular or oval or pear-shaped; associated gallstones usually have numerous polished facets, the result of pressure and mutual attrition; while when several stones are found accurately fitted to each other, they are said to be articulating. Very rarely these bodies have the shape of flattened, leaflike concretions, with glistening metallic surfaces, or they may assume the figure of pale-blue six-sided disks. Gallstones which are formed in the branches of the hepatic duct are small, rough or tuberculated, and of a

dark color, so that they have been compared to black peppercorns; while in a few instances they have been found branched and moulded to the shape of the bile-ducts in which they have been developed. And, lastly, gritty, sandlike deposits (biliary gravel) are met with in the excretory passages of the liver, consisting either of very minute calculi, or of a powder made up of cholesterin and cholochrome.

The size of gallstones varies from that of a small seed to that of the common fowl's egg. Solitary calculi are usually larger than those which are associated. Their weight is inconsiderable. When fresh, their specific gravity is greater than that of water or bile, though on being dried it becomes less, so that then they readily float in water. Their shades of color vary from a pearly white (when consisting of almost pure cholesterin) to a deep black; but perhaps most frequently they are of a reddish-brown tint. According to Frerichs, two forms of structure are met with: (1.) The simple homogeneous calculi, of a uniform texture, and presenting an earthy or saponaceous or crystalline fracture. They are rare. (2.) The compound calculi, consisting of a central nucleus, surrounded by a body or case of greater or less thickness, which in its turn is usually covered by an outer crust.

In the majority of hepatic calculi there is a brown or black *nucleus*. Dr. Thudichum, in his admirable treatise,* has shown that this nucleus sometimes consists of casts of the biliary tubes. Rarely it has been formed of some foreign body—as of a dried-up ascaris, a fragment of a Fasciola hepatica, a plumstone (the calculus having been developed in an abscess of the liver, the result of a perforating gastric ulcer), and part of a needle three-quarters of an inch long. Now and then four or five nuclei are observed, the result of the consolidation of originally separate calculi. The *body*, or that part of the concretion between the nucleus and crust, is generally striated, and consists of radiated crystals of cholesterin, or it presents concentric laminæ, or it is formed of an irregular mixture of cholesterin, with coloring matter and the products of decomposing bile. The outer *crust* can often be separated from the body like a shell; it consists of concentric layers of different thickness, and it may be made up of cholesterin, or of a compound of cholepyrrhin and lime, or of carbonate of lime.

The ingredients of gallstones are,—cholesterin (commonly from 80 to 90 per cent.); cholochrome or coloring matter, combined with earthy and alkaline salts—such as phosphate and carbonate of lime and magnesia; together with biliary and fatty acids. Gallstones arise from a decomposition of the bile, akin to putrefaction. The cholesterin of human bile "is dissolved in the taurocholate of soda. But as soon as the acid of this salt is decomposed the cholesterin is set free, crystallizes, and deposits upon any particle that may happen to be within easy distance, in the manner of all crystals, which like to post themselves upon prominent bodies" (Thudichum, p. 167).

The tendency to gallstones is rarely manifested until between the ages of thirty and forty years; though a few instances are recorded where these bodies have been found during infancy, and even in the newborn child. It is probable that females are nearly twice as liable to gallstones as males, owing to their more sedentary habits. Excess in eating and drinking seems to predispose to the formation of these substances; and so does the habit of taking only one meal daily, in consequence of which the gall-

* A Treatise on Gallstones: their Chemistry, Pathology, and Treatment, p. 60. London, 1863.

bladder is not emptied as often as it should be. Moreover, gallstones are thought by some authorities to occur more frequently in individuals of a tubercular, cancerous, or gouty diathesis, than in persons of a sounder constitution.

Calculi are but seldom met with in the branches of the hepatic duct. In this locality they generally present the appearance of small black seeds. They may give rise to dull pains about the liver, sometimes shooting to the shoulder; to symptoms of intermittent fever; to gastric disturbance, with nausea; while as they, for the most part, only cause temporary obstruction to the flow of a small quantity of bile, there is no jaundice. The hepatic duct is rarely blocked up by a concretion. When it is, the symptoms consists of intermittent pains, bilious vomitings, jaundice, and enlargement of the liver owing to the escape of bile from all the ducts being prevented. Sometimes fatal rupture of the hepatic duct has occurred.

Gallstones may be present in the gall-bladder without producing morbid derangements. Occasionally, however, they set up catarrhal or plastic inflammation, with pains about the epigastrium and right shoulder and hip; loss of appetite, indigestion, and constipation; while now and then ulceration and perforation have occurred. When the calculi leave the bladder and enter the cystic duct they give rise, unless very small, to well-marked symptoms (hepatic or gallstone colic). There is pain commonly of an excruciating character, the patients throwing themselves about the bed, so as to get relief by change of posture; while the right hypochondriac and especially the epigastric regions are very sensitive to pressure. Nausea and vomiting rapidly come on, the ejected matters consisting of half-digested food; the bowels are confined, and get distended with flatus; in thin individuals the distended gall-bladder can be felt; there may be rigors, but more commonly only a sensation of coldness; while the pulse is almost always retarded. The larger the stone, the greater will be the suffering and the longer its duration. If the stone recede into the bladder, the symptoms all cease; if it remain impacted we may have dropsy of the gall-bladder, and perhaps ulceration or gangrene of the duct; while when it is forced onwards into the common duct, there is a sense of partial relief. The pain returns, however, when the small duodenal orifice is reached. Supposing the common duct be long occluded, jaundice must make its appearance, since there is no outlet for the bile. Where the obstruction is permanent the jaundice will gradually increase, the liver progressively enlarges, and the gall-bladder becomes much distended; while death will ultimately occur unless the stone be forced into the bowel, or unless it induces adhesive inflammation and gets into the intestine or through the abdominal walls after ulceration and perforation have taken place.

At the end of an attack of biliary colic, the fæces should always be examined for the calculus; a work which can only be effectually done by washing them on a sieve with large quantities of water. Unless the stone come away, it will be apt to lodge in some portion of the small intestine; where it may gradually become incrusted with fecal matter, and at the end of a few months produce fatal obstruction of the bowels. On September 2d, 1858, I saw in consultation with Mr. H. J. Radcliffe, of Brentford, a lady fifty-nine years of age, who had experienced a severe attack of jaundice the previous Christmas. For this attack she had failed to have advice, but had prescribed "a black draught" for herself, which was thought to have acted well. Her recovery had apparently been perfect. On my visit she was suffering from complete obstruction of the bowels; a condition that proved fatal eight days afterwards, *i. e.*, fifteen days from the commencement of the seizure. At the autopsy, a gallstone, surrounded with

layers of animal matter and as large as a walnut, was found tightly wedged into the ileum just six inches above the cæcum.*

Biliary calculi are apt to set up inflammation and ulceration, and so to cause adhesions between the gall-bladder and neighboring parts. In this way gallstones have, as it were, eaten their way through the abdominal parietes, through the coats of the duodenum, and so on. St. Ignatius Loyola, the founder of the order of Jesuits, died in his sixty-sixth year (1556) from the ulceration produced by a gallstone through the walls of the gall-bladder into the trunk of the vena porta. Dr. Donkin has related the history of a case where death resulted from the mechanical pressure of a mass of gallstones on the vena porta, leading to obstruction of the portal circulation.

In the treatment of gallstone disease, we have first to relieve the pain and other derangements; and secondly, to cause the expulsion of the concretion, as well as prevent the formation of any fresh ones. For the *first* purpose, a hot water or vapor bath will be useful. Then the abdomen should be covered with the extracts of belladonna and poppies (F. 297), as well as with hot fomentation flannels or large linseed poultices. At the same time, a full dose of opium or morphia, with ether and tincture of belladonna (F. 315), is to be given; or if there be much sickness the officinal opiate enema, to which thirty drops of tincture of belladonna have been added, must be employed; or recourse can be had to the subcutaneous injection of morphia and atropin (F. 314). The inhalation of chloroform or ether, singly or in combination, is also of great service. Ice should be sucked to relieve the vomiting; unless from the patient's condition it be thought better to encourage the sickness, which can be best done by giving large draughts of hot water containing bicarbonate of soda. With regard to the quantity of opium that may be exhibited, no positive rule can be laid down. The dose must generally be sufficient to relieve the pain, but still it is to be given with caution; while care ought to be taken that it is discontinued immediately ease has been procured. Moreover, when full doses have been employed for a few days in succession, fatal narcotism may occur unexpectedly. Cases somewhat like that related by Dr. Percival† are not so very rare.

The *second* indication in the treatment—the expulsion of the calculus, and the prevention of further formations—is to be carried out by the administration of purgatives. Castor oil, Seidlitz powders, resin of jalap, or the officinal pills of colocynth and henbane generally act well. Remedies for dissolving gallstones are useless. Where there are no active symptoms, and yet it is believed that one or more calculi remain in the gall-bladder, saline aperients (F. 148, 149) should be persevered with for some time. A visit to the springs of Carlsbad (F. 496), Vichy (F. 479), Ems (F. 486), Pullna (F. 497), or Eger (F. 498), may be strongly recommended. In all cases

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* The Lancet, p. 447. London, October 30th, 1858.

† "A youth who was admitted into the hospital at —— on account of a violent spasmodic disease, which recurred periodically in the evening, after trying a variety of remedies, was directed to take the *extractum Thebaicum*, in such a quantity as might prove sufficient to mitigate the violence of the paroxysms. The dose amounted to twenty-two grains, and was repeated every night, during the space of a week, without producing any soporific effect. On the eighth night it was observed that he had no return of the spasm; and in the morning he was found dead. It is probable that a sudden alteration had taken place in the nervous system of this patient, and that the opium, in consequence of it, exerted with full force its usual powers on the body." The Works, Literary, Moral and Medical, of Thomas Percival, M.D., &c. Vol. iii, p. 422. London, 1807.

the diet ought to be carefully regulated; stimulants seldom do any good; while such exercise is to be recommended as can be borne without inducing any pain.

VIII. JAUNDICE.

Jaundice [from the French *Jaunisse*], or Icterus [perhaps from *Ἰκτις* = a weasel, the eyes of which are yellow], is a prominent symptom of many varied morbid actions. Like albuminuria, glucosuria, &c., it is not a separate disease, but rather a symbol indicative of changes going on in important internal organs.

Pathology.—The manner in which jaundice is produced has long engaged the attention of pathologists; and even now further observations and experiments are needed to solve many of the difficulties surrounding this question. According to Dr. Budd, it may be set up in two ways: 1st, by some mechanical impediment to the flow of bile into the duodenum, and the consequent absorption of the retained bile; and 2d, by defective action on the part of the secreting substance of the liver, owing to which the biliary ingredients accumulate in the blood. Hence we may have jaundice as the result either of obstruction or of suppression.

With regard to the first point, there is no dispute, and it is allowed that the greatest number of cases of jaundice are due to the reabsorption of secreted bile. But as to the second hypothesis Frerichs argues that, if it be true, the biliary acids and bile-pigment ought to accumulate in the blood in cases of granular liver, just as urea accumulates in the circulation in granular degeneration of the kidneys. Yet all attempts to detect traces of the essential elements of the bile in the blood generally, and in that of the portal vein in particular, have failed; neither the coloring matter nor the acids of the bile having been found. Moreover, Moleschott kept some frogs alive for several weeks after depriving them of their livers; but no trace of the elements of bile could be detected in the blood, lymph, urine, or muscular tissue. Frerichs therefore suggests that those cases of jaundice which occur without any mechanical obstruction of the excretory ducts of the liver (such as the jaundice of pyæmia, typhus, and snake-bites) are due to an arrested consumption of the biliary acids which have been reabsorbed into the blood, either from the intestine, or directly from the liver. He endeavors to show, that even in health, all the bile formed in the liver does not pass through into the ducts, but that a portion of it enters the hepatic veins along with the sugar. The biliary acids thus entering the blood, or which become reabsorbed from the intestine, are supposed to undergo certain changes from oxidation; which may thus account for the quantity of taurin that has been found in the healthy lung, and for pigments which are naturally voided in the urine. When, however, anything interferes with these normal metamorphoses in the blood, it is thought that the complete change of the colorless bile into urinary pigment is arrested, and that the intermediate substance—bile pigment—is formed in the blood, so as to color the various tissues and secretions. Now there appear to be great objections to this theory of Frerichs, and Dr. Harley has especially shown that the view as to the bile-acids being changed into bile-pigment is quite untenable. It will be remembered (see p. 47) that this gentleman believes that while some of the constituents of the bile are generated in the liver itself, there are others which exist, pre-formed in the blood. "If

this view of the biliary secretion be correct, it is perfectly evident that when the secretion of bile is arrested, those substances which the liver generates will be entirely wanting, while those which it merely excretes from the blood will accumulate there as soon as their excretion is prevented."* Consequently, in jaundice from obstruction, all the elements of the bile will be reabsorbed into the circulation; while in that from suppression there will only be an accumulation in the blood of the coloring matter of bile and cholesterin, no bile-acids being present, inasmuch as none have been formed.

Causes.—It need hardly be said that jaundice is due to some derangement of the functions of the liver. The chief difficulty is, however, in assigning the nature or origin of the derangement in different cases, since this gland is affected by so many dissimilar agencies. To make the subject as clear as the present state of medical science will permit, the causes of jaundice may be thus arranged:

1. *Narrowing of the hepatic and common ducts—*
   - *a.* Catarrhal inflammation of the mucous lining.
   - *β.* Compression of the under surface of the liver by fecal accumulations in the colon; by gastric or pancreatic tumors; by abdominal aneurisms; by large ovarian tumors; by the pregnant uterus; as well as by cancerous and other degenerations of the lymphatic glands in the fissure of the liver.
   - *γ.* Obstruction by gallstones, plugs of inspissated mucus, hydatids, and foreign bodies which have entered the ducts through the orifice in the duodenum.

2. *Closure of the hepatic and common ducts—*
   - *a.* Adhesions between the walls, the result of adhesive inflammation or of ulceration.
   - *β.* Firm impaction of gallstones and other bodies.
   - *γ.* Constant pressure from without by carcinomatous and other tumors of the pylorus, of the duodenum, of the head of the pancreas, and of the outer surface of the liver.

3. *Constriction or closure of the bile-ducts within the liver—*
   - *a.* Cancer, hydatid tumors, inflammatory exudations, &c., implicating the larger branches or the capillary tubes to a great degree.
   - *β.* Pressure exerted upon the ducts by enlargement of the hepatic cells in fatty degeneration.
   - *γ.* Congestion of the bloodvessels, the dilated capillary vessels compressing the ducts.

4. *Destruction of the hepatic cells—*
   - *a.* Acute atrophy.
   - *β.* Cirrhosis.
   - *γ.* Amyloid and fatty degenerations, &c.

5. *Jaundice without structural changes in the liver.*—There is either impeded circulation through the gland from distant disease, or some morbid change

* Jaundice: its Pathology and Treatment, p. 21. London, 1863.

in the blood, or deranged innervation, or a combination of all three conditions. Or perhaps some of the ingredients of the bile may be present in the blood in greater excess than the hepatic cells can separate. This set of causes may be thus tabulated:

α. Diseases of the lungs, heart, and nervous system.
β. Mental emotions, fright, intense anxiety.
γ. Dyspepsia.
δ. Snake-bites, alcohol, chloroform, ether, &c.
ε. Pyæmia, typhus, typhoid, and relapsing fever.
ζ. Remittent and intermittent fevers.
η. Yellow fever.
θ. Epidemic jaundice.

The foregoing table is only formidable in appearance. It needs no explanation, since the different diseases which give rise to jaundice have been treated of in the preceding pages. And after all, the point which it is chiefly important to bear in mind is this: that all forms of jaundice may be included under two heads, those due to suppression of the biliary functions, and those which arise from reabsorption of the secreted but retained bile. After jaundice from obstruction has existed some time, however, suppression likewise occurs; owing to the backward pressure exerted on the hepatic parenchyma by the overdistended bile-tubes forming an impediment to the circulation of the blood.

Symptoms.—The symptoms come on gradually or suddenly. In the former case, headache and depression, loss of appetite and nausea, constipation and pain about the right hypochondrium, are complained of for a few days before the jaundice is developed. With sudden attacks, the jaundice is the first symptom to attract attention. Then, in both instances, the skin and conjunctivæ are found of a yellow color; the urine has the hue of saffron, or a brownish-black tinge, according to the quantity of bile-pigment present; and the fæces are whitish, or of a light clay appearance. A peculiar itching of the skin is occasionally a source of annoyance; there may be exhaustion, drowsiness, giddiness, and peevishness; a bitter taste is sometimes experienced, with thirst; the pulse is often slow; while the function of digestion is more or less interfered with, especially as regards fatty articles of food. The addition of nitric acid, drop by drop, to some urine on a white plate, usually produces the well-known play of colors from brown to green, blue, violet, and red, which is characteristic of the presence of bile-pigment. In some exceptional instances, the corneæ, or the aqueous and vitreous humors have become jaundiced, and then all objects have appeared of a yellow hue. The duration of jaundice varies from a few days to several weeks—or even months.

When the disorder is of long continuance, there may be stupor, delirium, and other indications of cerebral derangement; the patient also becomes weak and thin from malnutrition; and frequently there appears to be a tendency to hemorrhage—as epistaxis, bleeding from the gums, hæmatemesis and melæna, purpura, &c. Supposing there is obstruction from a gall-stone, the most acute suffering is induced; the pains being paroxysmal, and often attended with vomiting and hiccup. Should the concretion not pass through the duct, fatal exhaustion may set in.

Dr. Harley has very clearly shown that the pathology of jaundice resulting from suppression is totally at variance with that arising from obstruction; and he points out a new mode of distinguishing these two conditions. Thus, in jaundice from suppression, the urine, if analyzed, will be

found to contain only those biliary ingredients which exist preformed in the blood; while in jaundice from obstruction, besides these, the urine also contains the materials generated in the liver itself, and which have been reabsorbed into the circulation from the overcharged gall-bladder and ducts. To discriminate between these conditions add gently to about two fluid drachms of urine half a drachm of strong sulphuric acid, and a fragment of loaf sugar the size of a pea. If at the line of contact of the two liquids a purple or scarlet color is produced, it proves that the acids of the bile are present, and the jaundice is due to obstruction; but if merely a browning of the sugar be produced, the case is probably one of suppression.

Treatment.—The treatment of jaundice will of course depend upon the nature of the cause which has given rise to it. For it is quite unmistakable, from the foregoing remarks, that the remedies which may effect a cure in suppression, must necessarily aggravate the mischief in obstruction.

To detail all the remedies which may be called for, would only be to repeat the suggestions thrown out in many of the sections on the various diseases of the liver. It will therefore suffice to say that in jaundice from suppression the secretion of bile may be stimulated by purgatives,—such as mercury, podophyllin, and sulphate of soda with taraxacum, &c.; by benzoic acid; by the mineral acids; and by the alkalies, in small doses, taken on an empty stomach, since they excite the flow of gastric juice, which in its turn acts upon the liver and gall-bladder.

On the contrary, in jaundice from obstruction, attempts must be made to remove the impediment, and if possible to diminish the activity of the hepatic cells until this has been accomplished. Most frequently a gall-stone forms the obstructing body, and the treatment required under these circumstances has been already described. To check the activity of the liver, recourse is to be had to simple aloetic purgatives, or to a mixture of the sulphate and carbonate of magnesia, as well as to mild diuretics. The food ought to be light and capable of being easily digested; while alcoholic stimulants should be avoided. Dr. Harley speaks highly of the use of pig's bile in cases of long-continued obstruction. Two capsules, each containing five grains of the prepared bile (F. 170), are to be given between two and three hours after the meal, when gastric digestion being almost concluded the food is about to pass into the duodenum. The bile thus taken seems in a measure to supply the deficiency of the natural secretion; the persistent absence of which causes great emaciation with weakness, and ultimately death from exhaustion owing to the imperfect manner in which the food becomes assimilated.

PART IX.

DISEASES OF THE PANCREAS AND SPLEEN.

I. DISEASES OF THE PANCREAS.

THE pancreas [from Πᾶν = all + κρέας = flesh] is a conglomerate body, analogous in structure to the salivary glands, though of a softer and looser texture. With its head embraced as it were by the duodenum, and its duct opening into this intestine, the two organs almost seem inseparable when we try to locate disease in one or the other. In length, the pancreas varies from six to eight inches; while its breadth is an inch and a half, and its weight from two to three ounces. From five to eight ounces of pancreatic juice are secreted daily; this fluid being analogous to saliva, viscid and alkaline, and having a sp. gr. of 1.008. Eberle in his treatise on digestion, published at Würtsburg in 1834, first showed that the pancreatic juice is capable of taking up fat in a very minutely subdivided condition, and of so forming a kind of emulsion. Then in 1848, Bernard demonstrated that fats are acted upon almost exclusively by the pancreatic juice, which forms with them a complete emulsion, and thus prepares them for absorption by the lacteals; all fatty matters passing through the alimentary canal undigested when the pancreas has been destroyed. Bernard also places the pancreatic juice at the head of the list of those digestive fluids which have the property of converting starch into sugar. There is also every probability that the capability of producing fatty emulsions is increased by the mingling of the pancreatic secretion with the bile, as well as with the intestinal juices derived from Brunner's and Peyer's glands, and the follicles of Lieberkühn, &c.

Disease of the pancreas is comparatively infrequent. The symptoms are generally obscure; so that it is commonly impossible to diagnose the exact nature of the affection or its extent, although we can feel tolerably certain that this gland is the seat of mischief from the imperfect way in which the digesting of fatty matters is performed.

The morbid conditions of the pancreas which may be met with are,—congestion, hypertrophy, inflammation, suppuration, induration, serous infiltration and softening, fatty and amyloid degeneration, atrophy, simple cystic tumors, obstruction of the duct, hydatid cysts, and either hard or soft cancer. Scirrhus is more common than encephaloid: the latter has been met with at a comparatively early age. Syphilitic gummata have been detected in the pancreas, in connection with muscular nodes; while it is not altogether unlikely that the cases of amyloid and fatty degeneration have been associated with a taint of this kind. Calculous concretions (composed of carbonate and phosphate of lime cemented by animal matter)

are not uncommonly found in the pancreatic duct or its branches. Such calculi are usually of a white color, they range in size from the circumference of a pea to that of a walnut, and they exist either singly or in numbers up to fifteen or twenty. All the foregoing affections are generally accompanied by enlargement and tenderness of the gland; while they often give rise to pain in the epigastrium with fulness or hardness, a sensation of heat and constriction, salivation, nausea and vomiting, loss of appetite, inodorous eructations, mental depression, and debility with emaciation. In not a few cases the vomiting has proved exceedingly obstinate; the matters ejected being large in quantity, transparent but rather ropy, and tainted with a slightly sour or saltish flavor. Where the common choledic duct is pressed upon by a tumor of the pancreas, or is involved in structural disease affecting the head of this gland, there will be persistent jaundice. Fatty stools have also been noticed in connection with certain diseases of the pancreas; for if the pancreatic juice is not secreted in due quantity, or if its flow into the duodenum be obstructed, the oily portions of the food will not be reduced to an emulsion, and hence instead of being absorbed must be discharged with the fæces.

The *treatment* of supposed pancreatic disease can only be conducted on general principles; that is to say, our efforts must be directed to alleviating the most prominent symptoms. As regards those cases where the vomiting is troublesome, drugs seem to be perfectly useless. It might be worth while to try the effect of a dose of pancreatin with the meals, or of the pancreatic emulsion if the patient can manage to swallow such a nauseous preparation; but I have had no opportunity of carrying this suggestion into execution. In one instance of chronic pancreatic disorder, benefit was derived from the employment of enemata containing a little opium and the solution of raw beef (F. 2); together with the introduction of a large seton in the abdominal wall over the seat of the gland. This seton was employed empirically, and in despair from finding all other treatment ineffectual.

II. DISEASES OF THE SPLEEN.

The spleen is of an oblong and flattened form, soft and elastic, very vascular, and of a dark-purple color; while in appearance it more resembles the placenta than any other organ. The spleen is situated in the left hypochondrium. The weight is very variable, but averaging six ounces; its length being about five inches, and its breadth rather more than three inches. The external surface is convex, and separated from the lower ribs by the under surface of the diaphragm; the internal border is concave, is in relation with the cardiac end of the stomach, and is divided by a vertical fissure—the hilus, at which apertures are found for the entrance and exit of the vessels and nerves. As the spleen has no excretory duct, it is often classified with glands similarly constructed (the thyroid, thymus, tonsils, and suprarenal capsules); but whether the ductless glands have all a common function, whether at one time or other of existence some or all of them assist in the elaboration of the blood, are questions not yet determined.

Dr. Crisp regards the spleen as "comparatively an unimportant organ in the animal economy;" and considers "that one of its offices is that of affording an adequate supply of blood to the stomach and liver, and to act as a resorvoir for the blood when the balance of the general circulation is

deranged;" while another purpose is "to secrete an albuminous fluid, which performs some part in the process of sanguification." The result of Mr. Gray's investigations led him to conclude that the function of the spleen "is to regulate the quantity and the quality of the blood."* The most recent view seems to be that this organ is concerned in the organization of the albuminous or formative matters of the food, and in gradually introducing them into the blood when they are needed; as well as in helping to develop the germs of subsequent colorless and colored blood-corpuscles. Subordinate to these offices the spleen may likewise serve as a kind of diverticulum to the gastric circulation, and, perhaps, to the portal system. Certainly this gland is smaller while digestion is going on than it is after this function is concluded; at which time it readily becomes distended.

The proposition, that the presence of this gland is absolutely necessary for the maintenance of life, cannot be supported. The spleens of many animals have been removed; and where the operation has not proved directly fatal (owing to the shock to the system, or to the development of peritonitis), the general health seems neither to have suffered, nor the duration of life to have been shortened. Indeed, on the contrary, the appetite appears to have increased, and the power of running without getting out of breath to have been acquired; whence the French proverb—courir comme un dératé. More than 1800 years ago, Pliny in his Natural History, speaking of the spleen, says: "This member hath a proprietie by itself sometimes to hinder a man's running: whereupon professed runners in the race that bee troubled with the splene, have a devise to burne and waste it with an hot yron. And no marveile: for why? They say that the splene may be taken out of the bodie by way of incision, and yet the creature live nevertheless: but if it be man or woman that is thus cut for the splene, hee or shee looseth their laughing by the meanes. For sure it is, that intemperate laughers have always great splenes." Further on also he tells us how Pyrrhus cured a diseased spleen by placing the great toe of his right foot upon the left hypochondrium of a patient who lay down before him.

Doubtless without any acquaintance with the foregoing writings, a Mr. Eagle, in the year 1835, advised all farmers to remove the spleens of their pigs for the purpose of fattening them more readily; while he also seems to have hinted that the extirpation of this organ would be justifiable in some cases of phthisis in the human subject.† And this proposal has not been deemed altogether unworthy of notice; for not only has the operation been performed, but Dr. Gustav Simon, of Darmstadt, has written a work on purpose to condemn it.‡ As, however, this gentleman compares it with ovariotomy, and looks upon both as unjustifiable proceedings, his views might not be considered of much value were it not that they are in some measure enforced by the histories of certain curious cases. Amongst these is to be found the doubtful instance related by Fioravanti in 1549, who persuaded Zaccarelli to excise the spleen (weighing thirty-two ounces) of a young Greek lady, by making an opening into the abdomen through the left side. The patient is said to have been quite well in twenty-four days. How far

* On the Structure and Use of the Spleen. By Henry Gray, F.R.S., &c. London, 1854.

† A Treatise on the Structure and Use of the Spleen. By Edwards Crisp, M.D., &c., p. 138. London. No date. Dr. Crisp gives the Lancet for 1835, as his authority for the above statement; but I have been unable to find any remarks on this subject in the volumes for the year mentioned.

‡ Die Exstirpation der Milz am Menschen, nach dem jetzigen Standpunkte der Wissenschaft beurtheilt. Giessen, 1857.

the operation was subsequently successful is not known. Fantonus has also related the history of a patient whose spleen was extracted by Ferrerius through the walls of an abscess which had been opened at the umbilicus. The woman survived the operation five years, within which time she became pregnant and underwent parturition. No appearance of a spleen could be found after death.*

Coming down to more recent times, we find that the spleen has been *completely removed* in the following cases: (1.) Quittenbaum, in 1826, extirpated an enlarged spleen, weighing about nine pounds, after passing a ligature round the vessels forming the pedicle of the organ; but the patient (a married woman, 22 years old) died in six hours. There was, however, cirrhosis of the liver, with ascites.† (2.) Dr. Küchler's case occurred in 1855, the spleen being removed while the patient (a man, 36 years of age) was under the influence of chloroform. He seemed comfortable immediately after the operation, but sank suddenly at the end of two hours from internal hemorrhage.‡ (3.) The case of Dr. Julian Schultz also happened in 1855. A woman fell from a height on to a cart-rack, which penetrated between the ribs and made a wound through which the spleen protruded. The latter was removed, and the patient left the hospital in good health at the end of a month. (4.) On November 20th, 1865, Mr. Spencer Wells removed a spleen which weighed 5 lbs. 12 oz. after nine ounces of blood had drained out of it. The patient was a married woman, thirty-four years of age, who had suffered from splenic hypertrophy for at least seven months. Death occurred, apparently from pyæmia, 158 hours after the operation.§ (5.) At Guy's Hospital on June 20th, 1866, Mr. Bryant extirpated the spleen of a young man twenty years of age, but death occurred from hemorrhage within three hours. The spleen weighed 4 lbs. 7 oz.‖ (6.) On November 4th, 1866, Mr. Baker Brown removed the hypertrophied spleen of a gentleman who was, I think, somewhat advanced in life. The case seemed hopeless, but Mr. Brown thought it proper to give the patient the chance which an operation afforded. Death took place directly after the removal of the gland. For these particulars I am indebted to Mr. Baker Brown. (7.) Dr. Péan on September 6th, 1867, removed a splenic cyst and a much hypertrophied spleen from a young lady twenty years of age. The operation, commenced under the idea that the disease was ovarian, lasted a little more than two hours. On the eighth day the patient could leave her bed to recline on a long easy chair, the wound having firmly cicatrized. From going out on the tenth day she became affected with delirium and some ataxic symptoms. During the sixth week there was an attack of adhesive phlebitis of the internal saphena. However, the catamenia returned for the second time on the sixty-fifth day after the operation, and the patient was declared cured.¶ (8.) Splenotomy was performed by M. Kœberlé on September 21st, 1867. The patient, a married woman 42 years old, had been in good health until 1864, when ascites set in with enlargement of the spleen. At the time of operation she was wasted, weakened, and pale. The blood contained $\frac{1}{10}$th of white corpuscles—45 times more than it should do. The vessels at the hilus of the spleen were enormously dilated; the splenic artery was as large

* Opuscula Medica et Physiologica, p. 195 et 203. Genève, 1738.
† Commentatio de Splenis Hypertrophia et Extirpationis Splenis Hypertrophici. Rostock, 1826.
‡ Exstirpation eines Milztumars. Darmstadt, 1855.
§ Medical Times and Gazette, p. 2 London, January 6th, 1866.
‖ Guy's Hospital Reports, Third Series, vol. xii, p. 444. London, 1866.
¶ L'Union Médicale, p. 340. Paris, November 26th, 1867.

as the femoral. Copious bleeding occurred at the operation from various vessels, especially from those in the abdominal wound. The blood coagulated with great difficulty. The operation lasted 90 minutes. The patient never recovered consciousness; her respiration got more and more embarrassed till death. The spleen was from 40 to 50 times larger than natural.* (9.) On November 9th, 1867, Mr. Bryant removed the spleen of a single woman forty years of age, who was very white and thin, had diarrhœa, slight albuminuria, &c. She had enjoyed good health until about two years previously. Death took place from hemorrhage fifteen minutes after the completion of the operation; the source of the bleeding being some soft sponge-like adhesions which had connected the spleen with the lower surface of the diaphragm, and which had been torn through. The spleen weighed 10 lbs. 4 oz.†

The foregoing cases need but little comment; each tells its own tale. But they emphatically teach us that in cases of leucocythæmia the enlargement of the spleen is merely one result of general constitutional depravity, and that this cannot be cured by any surgical operation. Where there is simply cystic disease of the spleen, as in Dr. Péan's case, or protrusion of an injured spleen through a wound in the abdomen, then extirpation may be attended with the happiest results.

The spleen has been *partially removed* in several instances with success. Not to go back to the case of Mathias in 1678, it will suffice to mention, that in December, 1738, Mr. John Ferguson related to the Fellows of the Royal Society the history of Thomas Conway, who had been wounded with a large knife, which had passed through the muscles of the forearm and into the left hypochondrium. The man was not seen until twenty-four hours after the accident, when the spleen was found protruded and quite cold, black and mortified. A strong ligature was placed above the unsound part, and three ounces and a half of the gland cut off, the remainder being returned into the abdomen with the ligatures hanging externally. The latter came away on the tenth day, and the recovery was subsequently complete.‡ M. Berthet has reported the following: A man in the prime of life had the left side laid open by a cut. Eight days afterwards M. Berthet found a hernia of the spleen, this gland being softened and emphysematous, and giving off a putrid smell. A ligature was placed around the protruded part, and most of the latter was immediately excised. The patient was cured, and afterwards enjoyed good health for thirteen and a half years. He then died from pneumonia, and at the autopsy there was discovered the remainder of the spleen, about the size of a hazel-nut, attached to the stomach.§

The spleen is apt to suffer from congestion, inflammation, softening, abscess, and gangrene; from tubercular, amyloid, and malignant disease; from syphilitic induration and subsequent disintegration, as well as perhaps from the deposition of gummous masses; from fibrinous deposits—the remains probably of extravasated blood; from the formation of serous and hydatid cysts in it, and also from simple enlargement. Individuals of all ages are liable to the foregoing affections, but they are more commonly met with among the residents of tropical and marshy than of tem-

* Gazette Hebdomadaire de Médecine et de Chirurgie, p 680. Paris, October 25th, 1867.

† Guy's Hospital Reports, Third Series, vol. xiii, p. 411. London, 1868.

‡ The Philosophical Transactions (from 1732 to 1744), Abridged, &c., vol. ix, p. 149. London, 1747.

§ Archives Générales de Médecine, 4e Série, tome v, p. 510. Paris, 1844.

perate countries. This gland may likewise be congenitally misplaced, and so rendered more than usually liable to injury from pressure, to congestion, &c. In a fatal case of rupture of an enlarged spleen reported by Dr. Buss,* the organ was found resting on the internal iliacus muscle in the left iliac fossa.

It can be readily understood that a structure like the spleen,—made up of an elastic fibrous framework (trabecular tissue), of Malpighian corpuscles, and of spleen-pulp—may become overdistended with blood from slight causes, and especially from such as interfere with the action of the skin, or of the liver, or of the kidneys. But congestion thus produced is seldom of any consequence, unless from its long continuance the elastic power of the organ gets so reduced that the accumulated blood cannot be urged forward. Probably in cases of the latter kind inflammation may be set up, leading either to softening or to permanent induration. In cases of suppuration, the spleen generally becomes connected with other organs by firm adhesions. The contents of the abscess can thus make their way through the diaphragm and into the left lung, so as to be expectorated; an instance of which, ending in recovery, has been recorded by Dr. Nasse, of Bohn. So also, the pus may be discharged into the stomach, colon, or peritoneal cavity; while in other cases it obtains an exit through the muscles and skin. I am only acquainted with a very few recorded examples of tubercular deposit occurring merely in the spleen; but genuine tubercles are not unfrequently found scattered through this gland in the bodies of children who have died from tabes mesenterica, as well as of adults who have perished from general tuberculosis. Cancer occurs very rarely; while where it has been discovered there has usually existed malignant disease of the liver and mesenteric glands. When the spleen is ruptured from a blow, severe muscular exertion, &c., death generally occurs, in the course of an hour or two, with all the symptoms of internal hemorrhage.

Enlargement of the spleen (vulgarly known as "ague-cake") is readily diagnosed by the spreading out of the tumor from the left hypochondrium, by the external smooth and convex surface which the gland presents, by the hilus or vertical fissure dividing its internal surface, and by the history of the case. The swelling results very commonly from intermittent fever or ague; but as a rule only after several attacks. Splenic enlargement in connection with a syphilitic cachexia is not so very uncommon in children. The same condition is now and then met with in leucocythæmia, and also among pregnant women; the hypertrophy in the latter being accompanied with a degree of softening, so that there is a predisposition to laceration under any extra strain or sudden excitement. Patients affected with tumid spleen can sometimes be immediately recognized by their peculiar sallow and unhealthy aspect, by the dingy discoloration of the conjunctiva, and the anæmic appearance of the gums and oral mucous membrane. The sufferers are liable to hemorrhage from various tissues of the body; so that they must be looked upon as unfavorable subjects for even minor operations. There are also various derangements of the organs of digestion, with irregularity of the bowels, and dark-colored offensive motions; there is muscular debility; and we often find a general unhealthy state of the system, with a tendency to sloughing sores from slight causes. The gland may be tender on pressure; but severe pain is seldom present unless the peritoneal covering be acutely inflamed. In protracted cases, there will be a tendency to general dropsy. If we prick the finger and minutely examine a drop of blood in leucocythæmic hypertrophy, the nature of the

* The Medical Times and Gazette, p. 530. London, November 7th, 1868.

disorder will be rendered certain by our finding a large excess of colorless corpuscles. Where the blood is much altered from its natural condition, as it often is with this cachexia, we can sometimes detect a systolic cardiac bruit; but abnormal præcordial dulness with cardiac murmur may likewise arise from an enlarged spleen displacing the heart upwards, and preventing the free descent of the diaphragm and full expansion of the left lung.

As regards many splenic affections the disease seems to have wonderfully little effect on the general health; a feature which lends further support to the physiological doctrine that this gland is not a very important one. In some few cases which have been under my care, the enlargement has been so great that the gland has occupied the entire left half of the abdomen; and in these, general debility has been the prominent symptom. The structure of the spleen may not be otherwise than healthy in such instances of enlargement; or the tissues will perhaps be found indurated and the capsule thickened; or numerous cysts, of variable size, have been scattered throughout the gland.

When the enlargement is the result of ague, purgatives with bark or quinine will be necessary. In other cases steel, or the bromide of potassium, may prove the most efficacious remedies. Mercury in any form is injurious; and so is depletion. Under all circumstances the general health must be supported by good nourishing food; as well as by cheerful mental occupation, with residence in a dry and bracing locality.

PART X.

DISEASES OF THE ABDOMINAL WALLS.

I. INFLAMMATION OF THE PERITONEUM.

THE peritoneum [from *Περιτείνω* = to stretch all over] or serous membrane lining the abdominal and pelvic cavities, and investing the viscera, is apt to suffer from acute or chronic inflammation.

1. ACUTE PERITONITIS.—Acute inflammation of the peritoneum is a serious disease, accompanied with pain and swelling of the abdomen, and severe symptomatic fever. It may attack individuals of all ages and of every rank in life; though it is perhaps seen most commonly among the poor, since cold and damp will induce it in systems enfeebled by bad living. The average annual number of deaths from peritonitis, registered in England during the ten years 1857–66, has been 1554; the greatest mortality (1736) having occurred in 1864.

All serous membranes become vascular and of a bright-red color under the influence of the inflammatory process; a large number of small scarlet patches at first appearing, which gradually coalesce and spread until perhaps the whole tissue presents the characteristic hue. The morbid action may end in resolution, merely leaving the peritoneum opaque and thickened; or if it proceed beyond a certain stage there will be effusion of serum—perhaps to such an extent as to produce inflammatory dropsy, or coagulable lymph may be poured out causing adhesion between the apposed surfaces of the membrane. In extreme cases suppuration and ulceration take place; there are flakes of lymph floating in pus or serum, and sometimes the large or small intestines have been perforated. Those parts of the peritoneum covering the stomach, omentum, mesentery, and bladder, appear less liable to become inflamed than the portions over the convex surfaces of the liver and spleen, the iliac fossæ, and the small intestines.

The earliest *symptom* in many instances is pain, which is at first confined to parts of the surface, but soon extends over the whole abdomen, is much increased on pressure, and is attended with high fever. It is frequently preceded by chilliness and rigors, with a feeling of weakness; in other cases it comes on abruptly, with acute distress in some part of the abdomen—not uncommonly in the hypogastric or one of the iliac regions. The pain is generally exquisitely severe, it causes much depression, and it is aggravated by any movement which calls the abdominal muscles into action, such as passing a stool, voiding urine, or even taking a full inspiration. An examination can scarcely be borne; pressure, even the weight of light bedclothes,

being insupportable. The patient consequently lies quiet on his back, with his knees bent and the legs drawn up. The abdomen is tense, hot, and frequently tympanitic; the bowels are constipated, and there is often most distressing nausea and vomiting. The skin is burning and very dry at first, but soon the extremities become cold and damp. The pulse is frequent and weak, the respirations are hurried, there may be hiccup, and the tongue is thickly furred. Where there is much intestinal distension from flatus there will be painful dyspnœa, chiefly owing to the diaphragm being pushed up by the greatly swollen stomach and bowels. Moreover, the countenance is always expressive of suffering and of great anxiety. After a time the belly ceases to be tympanitic, although it remains somewhat enlarged from the effusion of serum. When a fatal termination is approaching, the symptoms of collapse increase hour by hour. The abdomen often becomes much distended, the pulse gets very feeble and quick—150 or upwards—the countenance assumes a ghastly expression, attacks of retching and hiccup follow at short intervals, a cold clammy sweat covers the body, and death occurs within eight or ten days from the beginning of the disease.

The principal *causes* of peritonitis are cold and damp, mechanical violence, perforation of the stomach or intestines, rupture of the urinary bladder, the bursting of hepatic abscess, &c. It may also arise from inflammation of the coats of the stomach or intestines; from disease of the ovaries and uterus; from pelvic cellulitis; as well as from the contamination of the blood by morbid poisons—especially perhaps by that of erysipelas.

The fearful malady to which women recovering from childbearing are liable, termed PUERPERAL FEVER, is very generally accompanied by peritonitis; or perhaps it may be more precise to say that in the most common form of this disease the force of the poison seems to be expended upon the peritoneum. The disease usually comes on about the third day after labor, but sometimes not until the fifth, beginning with one or more rigors followed by fever. The inflammation commences in the uterine portion of the peritoneum, and spreads rapidly over the whole of its surface. In its local symptoms it does not differ from common acute peritonitis, while to the ordinary constitutional results of the latter will be added those of pyæmia. The inflammatory fever seems to result from contamination or poisoning of the blood, either by putrefaction of part of the placenta left in the uterus, or by the absorption of some of the products of inflammation; or it can arise from indirect exposure to the poison of erysipelas, or to effluvia given off by the dead body, or it may be due to direct contagion, as is seen in lying-in hospitals. There is, unfortunately, no doubt that this disease may be carried by a third person from one parturient woman to another (see p. 52), and consequently a practitioner, when he has attended a patient with puerperal fever, is bound, I believe, to discontinue for a time his attendance upon cases of labor. Changing his clothes, washing his hands with a solution of chlorine or of permanganate of potash, or of cyanide of potassium, wearing oil-silk gloves, will not (it is to be feared) prevent him from carrying the poison of this malignant disease about him; and I should therefore recommend that he absent himself from the lying-in room for at least three weeks from the last day of his exposure to the fever. In proof of the justice of these remarks it may be mentioned, as noticed by Dr. Armstrong, that in an epidemic of this disease which occurred in Sunderland, in 1813, forty-three women suffered; of these, no less than forty were attended in their labors by one surgeon and his assistant.

In the *treatment* of acute (as well as of puerperal) peritonitis, the patient's diet must at first be restricted to milk, gruel, arrowroot, and beef tea; allowing plenty of diluents, such as iced water, tea, barley-water, &c. The greatest quiet ought to be maintained in the sick-room, the air of which should be warm but pure. As I have no faith in the power of antiphlogistic remedies for checking the inflammation, I never resort to them. But we have one remedy which is invaluable, and that is opium. This drug should be given in grain doses, every three or four hours, until the pain is thoroughly relieved; and I believe that by it alone we may often save the patient's life. Sedative fomentations, properly and sedulously applied, also afford great relief; or covering the abdomen with a mixture of four parts of extract of poppies to one of extract of belladonna, and then fomenting, will prove very serviceable. As I have adopted this plan of treatment in all my cases for several years, and am fully convinced of its value, I trust that it will be fairly tried without inflicting general bleeding and antimony and mercury on the sufferer. Blisters are most pernicious, though often employed. Even leeches are quite unnecessary; provided the fomentation flannels be applied loaded with steam, and that they are changed every fifteen or twenty minutes. Linseed or hemlock poultices, made sufficiently moist and thick to retain their heat for three or four hours, may be advantageously substituted for the fomentations as soon as the patient can bear their weight without inconvenience. In all instances purgatives by the mouth do harm; but if there be evidence to show that the large intestine is oppressed with fecal matter, the latter should be removed by one or two enemata. Where great distress is caused by the flatulent distension, puncture of the intestine with a fine capillary trocar would at least afford temporary relief. Directly great exhaustion sets in stimulants must be given; no agent of this class being better than brandy. Essence of beef, cream, milk, raw eggs, full doses of quinine, and ammonia, with chloric ether, are also often invaluable in staying that prostration which, unless properly treated, soon ends in fatal collapse.

2. CHRONIC PERITONITIS.—This is sometimes the sequel of an acute attack, though more frequently an independent affection. The inflammation may be partial or general.

M. Louis is of opinion that this disease, when not following acute inflammation, is always complicated with tubercles. On this point, however, Dr. Hodgkin says:* "My own inspections would lead me also to the conclusion that chronic peritonitis is very frequently conjoined with tubercles; yet this concurrence has not been so uniformly supported by cases observed in this country, as it has been by Louis' cases. That form of peritonitis which is accompanied by copious effusion, and which might easily be regarded as ascites, occurs without any appearance of tubercles. The same may be said of other cases in which the concrete product of inflammation had been more considerable."

Young children, especially such as manifest the strumous diathesis, are very often affected with *tubercular peritonitis*. This disease is by no means confined to them, however, for it is not unfrequently met with in adults between 18 and 25 years of age; particularly in those who, being hereditarily predisposed to phthisis, have led dissipated lives, or have been exposed to great hardships with insufficient food. Upon examining the peritoneum after death, its substance will, perhaps, be found merely studded with

* Lectures on the Morbid Anatomy of the Serous and Mucous Membranes, vol. i, p. 149. London, 1836.

miliary tubercles; or there may be a more abundant tubercular deposit, which with lymph glues the coils of intestines together, while it covers the liver and spleen with thick cheesy membranes. Sometimes one or more of the masses of tubercle in their softening give rise to ulceration and perforation of the intestinal coats; a fecal abscess alone resulting, inasmuch as effusion of the contents of the bowel is prevented by the adhesions which have previously formed. In the same way, different portions of intestine may communicate with each other by fistulous openings, without even fecal abscess resulting. I have also seen the fecal abscess lead to perforation of the abdominal parietes—an artificial anus. As a general rule, the mesenteric glands are enlarged and indurated; while, if the morbid action has been of some duration, they will be found softened in their centres.

The *symptoms* of chronic peritonitis are somewhat obscure, the abdominal pain being usually slight. There are often attacks of colic; while at other times there may be fever, with unhealthy fetid secretions and diarrhœa. Generally, treatment gives relief for a time; but at the end of a few weeks the abdomen again gets tender and becomes tense, there is more obstinate diarrhœa with nausea, all desire for food vanishes, the patient wastes rapidly, and the appearance becomes very anæmic. After a time, effusion of fluid takes place, the abdomen enlarges, and fluctuation is felt. When with tubercular peritonitis there is combined disorganization of the mesenteric glands, pulmonary phthisis, &c., the complicated disease rapidly progresses towards a fatal termination.

The *treatment* had better consist in paying attention to the functions of the digestive organs, so as to insure correct assimilation; in allowing a mild but nutritious diet, with plenty of milk or cream, raw eggs, and the solution of raw meat (F. 2); and in employing flying blisters or stimulating liniments to the abdomen. Pepsin (F. 420) is ofttimes serviceable. The application of the iodine liniment mixed with a little of the aconite or belladonna liniment, or of the iodine ointment diluted with an equal weight of cod-liver oil, can be strongly recommended. I think I have seen benefit likewise from the internal use of iodide—particularly the iodide of iron, from bark with sedatives, from the phosphates of iron and lime, &c. (F. 405), and especially from cod-liver oil. These cases are, it need scarcely be added, very unpromising.

II. ASCITES.

Ascites [from Ἀσκὸς = a wine-skin or leather bottle, because of the swollen condition of the belly], or dropsy of the peritoneum, consists of a tense swollen condition of the abdomen, owing to the presence of an excessive quantity of watery fluid in the cavity of the serous membrane by which it is lined.

Causes.—The dropsy may arise from chronic peritonitis; from cirrhosis, cancer, obliteration of the portal vein, and amyloid or scrofulous disease of the liver, causing obstruction to the free passage of the blood through the system of the venæ portæ; from acute or chronic Bright's disease of the kidney; from disease of the heart, or of the aorta; from disease and enlargement of the spleen; from malignant affections of the omentum; and from a few other more simple disorders. Cirrhosis and renal disease are, however, the most common causes.

Pathology.—This subject has already been treated of in the remarks on dropsy (p. 105). The fluid of ascites is usually clear, of a pale yellow color like urine, of an alkaline reaction, and often loaded with albumen. An analysis of this fluid by Marchand showed the composition to be as follows:

Water,	952.30
Albumen,	23.80
Urea,	4.20
Chloride of sodium,	8.10
Carbonate of soda,	2.10
Phosphate and sulphate of soda,	0 60
A viscid substance,	8.90
	1000.00

Symptoms.—The appearance of the patient is often thoroughly characteristic. The upper part of the body may be much wasted, the features pinched, and the countenance very anxious, while the abdomen is greatly enlarged. On examining the latter it is not only found distended, but the integuments have a shining appearance; while the superficial veins are generally dilated. Fluctuation is more or less appreciable, according to the quantity of fluid and the thickness of the abdominal walls. During the advanced stages there may be considerable dyspnœa, owing to the pushing upwards of the spleen, stomach, and liver. Auscultation of the chest shows that the respiratory murmur cannot be heard as low as in health; that there is tubular breathing in the interscapular regions, especially towards the left side; and that the apex of the heart is elevated, and rather pressed to the left. Commonly there is anasarca—infiltration of limpid serum into the areolar tissue, with the ascites; in most cases the former being confined to the lower extremities, though the face and arms may also be affected, particularly in examples of renal dropsy. The tissues affected with anasarca "pit," on applying pressure. The urine is usually scanty, and often loaded with lithates; while in ascites from cirrhosis it generally contains bile, and in that from renal disease there is an abundance of albumen. The general health gradually deteriorates; while the patient gets weak and emaciated, loses all appetite, is restless at night, and suffers much from mental depression.

Diagnosis.—In typical cases the diagnosis is easy enough; but every now and then the physician meets with an instance where a very thorough investigation is needed to prevent any error. And at the onset I must urge, that in cases of difficulty, whether in the male or female, it is a good plan to empty the bladder with a catheter. By doing so, the examination will often be facilitated; while all chance of mistaking a greatly distended urinary bladder for an abdominal or an ovarian dropsy must be removed.

On examining a case of ascites in which the fluid effused is tolerably abundant, a general fulness of the abdomen can be distinctly noticed. If the patient be standing upright, the fulness will seem to be most prominent below the level of the umbilicus; but by making the subject lie down, the abdomen is seen to become more flat, while both the flanks bulge outwards. When placed on one side, the lowermost part exhibits the greatest prominence. Supposing the quantity of liquid to be excessive, there may be found a general abdominal enlargement, uninfluenced by the posture assumed; while the abdomen will also appear to encroach considerably on the thorax, and the xiphoid appendix with the cartilages of the lower ribs will be much everted. By practicing palpation some very characteristic

signs are usually discovered. The great evenness of the enlargement, together with the sense of resistance and weight which is experienced on pressing the hand towards the spine, will first excite attention. Then the evident sense of fluctuation communicated to the fingers arrests attention; the waves being finer, and following more or less quickly upon the impulse in proportion as the distension is great, and the fluid serous or of a watery consistence. Œdema of the abdominal wall, or the presence of much fat, obscures this last sign. Adipose tissue in excess, whether in the omentum or present as a large fatty tumor, has given rise to great abdominal enlargement which has been mistaken for ascites. The sense of fluctuation has been so closely simulated, that patients have even been tapped in these cases of fatty deposit.

On having recourse to percussion in ascites, there will be found, in most cases, well-marked resonance over the higher parts of the belly, owing to the floating of the intestines; thus, as a rule, prominently distinguishing ascites from ovarian dropsy. I say, in most cases, for the distension is sometimes so great that the breadth of the mesentery is not sufficient to allow the intestines to reach the surface of the fluid, or the coils of intestines may be bound down by adhesions formed of coagulable lymph; and then in either instance, dulness must, of course, result. Again, there is occasionally (though very rarely) resonance on percussion in ovarian dropsy. This may happen after tapping, from the cyst filling with air; or it may occur from a communication forming between the cyst and the intestine, and so allowing of the escape of flatus from the latter into the former. I have noticed, however, that ordinarily where there is any real difficulty in the diagnosis of ascites and ovarian dropsy, the mere fact of difficulty may be taken as presumptive evidence in favor of the case being one of ascites. Ovarian dropsy very rarely simulates ascites; and never, save where there is a large unilocular cyst with thin walls. In both diseases there will be dyspnœa, which will be urgent in proportion to the distension. The quantity of the ascitic effusion is sometimes remarkably large. Several years since I was obliged, owing to the severe orthopnœa which existed, to tap a patient in the Hospital for Women suffering from ascites; when 460 ounces of a clear, urinous-looking fluid, loaded with albumen, were removed, the whole of which had been secreted in rather less than one month.

Prognosis.—This is always unfavorable in ascites from organic disease. When the effusion is merely due to the action of cold causing congestion of the kidneys, or to functional derangement of the heart, or to an anæmic state of the blood, the danger is comparatively slight. The supervention of dropsy upon structural disease of the heart, or liver, or kidneys, is always a premonition that matters are advancing towards an unfavorable conclusion. This is not likely to be postponed by the addition, to the primary symptoms, of all those mechanical troubles which must be produced by the presence of perhaps several gallons of fluid within the abdomen. The deaths registered in England as due to pure and simple ascites, average about 750 annually.

Treatment.—Supposing that the cause of the dropsy is remediable, our object must be to remove it. The cases where this can be done, are, however, quite exceptional. We have therefore to try and procure absorption of the fluid; and with this intent recourse is had to drastic purgatives, to diuretics, and perhaps to mercurials. With regard to purgatives, few agents generally act better than the compound jalap powder, in doses varying from sixty to one hundred and twenty grains. Elaterium (F. 157) is often useful; so is calomel with jalap (F. 159), podophyllin (F. 160), gamboge with aloes and blue pill (F. 174), and croton oil (F. 168). The

best diuretics, perhaps, are the acetate of potash, digitalis, squills, and the juice of broom tops (F. 219); or the solution of potash, nitrous ether and digitalis (F. 220); or spirit of juniper, nitrous ether, and winter green; or digitalis and squills, with blue pill or taraxacum (F. 219, 224); or urea (F. 225), where the kidneys are healthy; or nitric acid and taraxacum, where a tonic action is also needed. The chloride of ammonium, either singly or with taraxacum (F. 60), has been found useful in Germany. I have seen benefit also from the iodide of potassium, combined with the ammonio-citrate of iron (F. 32), where there has been evidence of any strumous or syphilitic taint in the system. As a rule, in ascites dependent upon renal disease, diuretics do harm; while calomel, blue pill, &c., prove especially pernicious. We had better, therefore, in such instances, trust to the simplest purgatives, to nitric acid in some bitter infusion, together with frequent hot-air or vapor baths. I have at times found belladonna act favorably in these cases.

When the distension gives rise to much distress, we shall often have to resort to paracentesis. In performing this operation, the individual to be tapped ought to lie upon the left side, along the edge of the bed; and the trocar and canula should be introduced midway between the umbilicus and pubes. The horizonial position is preferable to any other; since it is the most comfortable to the patient, no pressure is required upon the abdomen, and especially because syncope is much less likely to follow the evacuation of the fluid. After the operation I pad and tightly bandage the abdomen, and generally continue the use of compression for two or three weeks, or even longer where it seems to be beneficial; while at the same time iodide of potassium is frequently given, and occasionally alterative doses of mercury. In spite of all treatment the fluid is usually, though by no means always, resecreted; and in such cases the disease ultimately proves fatal. The advantages of tapping, however, are not only that there is a chance of cure by it, and that the patient's comfort is much increased by the withdrawal of the fluid, but that the liver and kidneys and other abdominal viscera being freed from abnormal pressure are enabled to act more naturally.

III. ABSCESS OF THE ABDOMINAL PARIETES.

Severe contusions of the abdominal walls may be produced by kicks, blows, a fall upon some prominent object, or a squeeze between the buffers of two railway carriages, &c. The consequences are often very serious. A blow sometimes causes death immediately, owing to syncope from the shock to the solar plexus of the sympathetic. In other instances there will perhaps be laceration of some internal structure, with hemorrhage; the injured individual, often but not necessarily always, dying at the end of a few hours, from the combined effects of shock and loss of blood. Occasionally, the contusion causes rupture of an internal organ, with extravasation of its contents. There need not be any bruise or other external symptom of injury, and yet the tissues of the gall-bladder, liver, spleen, stomach, intestinal canal, or pregnant uterus, may be torn through. The patient either dies soon afterwards from collapse, or from hemorrhage; or surviving these dangers, from peritonitis after a long interval. On the other hand, instances have occurred of laceration of the liver or kidney, where

the patients having got over the first effects of the succeeding inflammation have yet fallen victims, at the end of a week or so, to blood-poisoning from the absorption of the extravasated fluids. And, lastly, a contusion merely perhaps sets up inflammatory action in a limited portion of the abdominal wall, this action going on to suppuration.

Independently of external violence, an abscess in the abdominal parietes may be due to the extension of disease from other parts. Thus, it sometimes results from inflammation and suppuration of the vermiform appendix of the cæcum, the pus working its way to the surface somewhere about the right inguinal region. So again, suppurative inflammatory action is apt to occur in the connective tissue of the pelvis, or in either ovary, especially in delicate and strumous women; the abscess afterwards pointing in one of the groins, in the hypogastric region, or in the vagina, bowel, &c. Inflammation and suppuration of the adipose and areolar tissues around one of the kidneys (perinephritic abscess) may occur from a blow or fall upon the back, or from some derangement of the general health. In favorable cases the abscess points in one loin; but occasionally the pus burrows amongst the muscles of the dorsal region, and may ultimately be discharged into the ureter, or into the cavity of the peritoneum. Then, finally, a circumscribed abscess may form in the peritoneum, as the result of partial or general peritonitis; the pus, confined by adhesions, either approaching the surface at some part of the abdominal wall, or bursting into the sac of the peritoneum, or into the bowel, &c.

The *diagnosis* of abscess in the abdominal wall is not always so easy as might be imagined; except, of course, in those cases where the tumor is prominent and has softened, allowing fluctuation to be readily detected. Spasmodic contractions of portions of the abdominal muscles are very apt to occur under the influence of emotion, palpation, &c., the tense parts communicating to the hand of the examiner a feeling very much like that of a tumor. The rectus muscle on either side, traversed as it is by from three to four tendinous intersections (the lineæ transversæ), often contracts in one or two divisions and gives an erroneous sensation to the hand applied over it. Steady pressure, together with the withdrawal of the patient's attention from the proceeding, will often relax the muscular fibres and prevent any erroneous conclusion being drawn. An abscess in the epigastric region can be sometimes seen and felt to pulsate, owing to the force derived from the aorta. But this generally occurs in thin subjects; the pulsation ceasing if the tumor be lifted up, or if it be gently moved to one side away from the influence of the deep vessels. Disease of the liver, hydatid tumors, and a distended gall-bladder, have given rise to the impression that an abscess was present in the right hypochondriac region; while enlargement of the spleen has acted in the same manner on the left side. And, lastly, a bladder distended with urine has been mistaken for an abscess, until further inquiry has led to the use of the catheter.

The *treatment* of abscess in the abdominal wall is not very difficult; for, directly the practitioner is certain that pus is present, a free incision should be made into the most prominent part of the tumor to permit of the ready escape of the matter. If there be merely a hard circumscribed swelling, however, attempts can reasonably be made to check the inflammatory process and to insure resolution, by rest, fomentations, and the administration of the carbonate of ammonia with bark (F. 371). In cases where suppuration has become established, and the abscess has not been opened, fecal fistula has sometimes resulted; the pus making its way externally and at the same time burrowing backwards, until the ulceration has extended into a portion of adherent bowel.

IV. PHANTOM, OR MUSCULAR TUMORS.

The fact has just been noticed, in the preceding section, that spasmodic contractions of portions of the abdominal muscles are apt to give rise to a feeling as if a well-defined tumor were under the hand of the examiner. But in alluding to this circumstance, attention was more particularly directed to those instances where only the muscles of the anterior wall of the abdomen take on this curious action under the influence of manipulation. The cases now to be treated of are much more remarkable; for in them it would seem as if all the abdominal muscles, but more especially the diaphragm, were concerned in producing an appearance exactly resembling that caused by a large foreign body.

As far as my experience goes, these large phantom tumors occur only in the female sex. The pseudo-growth varies in size from an ordinary melon to that of a fœtus at the full term. In some women the enlargements give rise to many of the symptoms produced by gestation; so that we have the condition known as spurious pregnancy,—the *grossesse simulée par illusion pure* of French writers. Occasionally, the imaginary gestation is followed by a spurious parturition; and I have seen a lady walking about her apartment, with sharp and frequently recurring pains of labor, and surrounded by all the paraphernalia of the lying-in room, where there was no pregnancy, nor even a real abdominal tumor.

The muscular tumors which simulate disease, will appear entirely or partially to fill the abdominal cavity. They are either stationary and firm and unyielding, or they change their relative position from day to day, or they seem movable, and as if attached by a long pedicle. Moreover, they may be insensible to the touch, or acutely tender; and they perhaps temporarily melt away under the influence of steady and prolonged manipulation, or they disappear for many days or even weeks and then return, or they remain persistent for years.

The question naturally arises—What is the *nature* of the abdominal swelling in this affection? It was long thought that the symptoms of phantom tumors or of spurious pregnant uteri were due simply to the distension of the intestines by flatus, combined with the excessive deposition of fat in the abdominal integuments and in the omentum. We are told, that on examining the body of Joanna Southcott, after death, the womb appeared smaller than natural, free from disease, and containing neither "the promised Shiloh, nor any other fœtus;" but the walls of the abdomen were four inches thick from fat, the intestines were distended with gas, and the omentum was one large mass of adipose tissue. Very possibly the combination of these conditions may alone have sufficed to produce the disorder in other instances; but without a doubt, in the majority of cases, there is something more. This additional something is probably irregular or excessive action of the diaphragm and other abdominal muscles, by which the intestines are forced low down in the cavity of the abdomen. In many instances, also, it has been thought that irritation or chronic inflammation of one or both ovaries existed; this irritation producing contraction of the muscles by reflex action. And again, it has not unfrequently been found that the patient was suffering from some displacement of the uterus—retroflexion, or anteflexion, or retroversion.

That the *diagnosis* is often a matter of difficulty is certain from the serious mistakes which have been made by eminent men. In the statistical account of eighty-one cases of ovariotomy collected by Mr. Benjamin

Phillips,* it is shown that in as many as five instances no tumor at all was found upon cutting into the abdomen; and at least two more examples of this blunder have occurred since this gentleman's report was published. When these swellings seem to shift their position, they have now and then been mistaken for movable kidneys. It is well known that occasionally both the renal organs present an unusual degree of mobility; or one kidney may be movable to a considerable extent, while the other is stationary. So also a spleen displaced downwards can form a palpable tumor, as low as the left iliac region; while should there also happen to be any displacement or hypertrophy of the pancreas, a very puzzling enlargement will result.

The chief points, by attention to which the practitioner can reasonably hope to avoid error, are the following: (1) As the patient lies upon her back, with the abdomen exposed, there will be all the appearance of a solid tumor: nevertheless, on practicing percussion, a resonant sound will generally be obtained. This test, however, is often rendered uncertain by the excessive deposition of fat in the abdominal walls, or in the omentum; while there may be such great intolerance of pressure, that it will be hardly possible to make a satisfactory tactile examination. (2) There is usually a considerable arching forwards of the lower dorsal and upper lumbar vertebræ; so that the practitioner can easily pass his hands under the patient's loins. (3) Very often positive symptoms of ovarian or uterine irritation are present. The chief of these consist of tenderness on manipulation over one iliac region, or above the pubes; irregularity or suppression of the catamenia, with an abundant leucorrhœal discharge; piles and tenesmus, or troublesome irritability of the bladder; intense and almost constant backache; and neuralgic pain extending down one leg, combined perhaps with retraction of the limb. And (4) if the patient be slowly, but thoroughly placed under the influence of chloroform or of ether, the abdomen will be seen to flatten, and the tumor to entirely subside; the latter slowly melting away, in proportion as the anæsthetic relieves the diaphragmatic and abdominal muscles from the influence of the reflex nervous action. As consciousness returns, however, the muscles become tense and prominent, and the swelling gradually forms again, until the tumor is found possessing all its original characters, by the time the insensibility has completely passed off.

The general *symptoms* presented in these cases demand a short notice. The patients are generally in bad health, being often anæmic; while they are also sufferers from those varied phenomena which are so constantly set down as due to hysteria, or to the so-called "spinal irritation." They are not unfrequently the victims of neuralgia; and they either have amenorrhœa, or dysmenorrhœa, or leucorrhœa. They suffer from mental anxiety, independently of the uneasiness produced by their health. The digestive functions are ill-performed and the bowels are consequently constipated. The disposition is often tranquil; the patients like to be quiet, and rather shun the society of their friends; and, if allowed, they will pass much of their time in bed. Doubtless, in some cases, bad practices are resorted to. But in none of the examples which have fallen under my notice have their been any indications of an attempt at feigning disease. Indeed, the swelling always gives rise to great general uneasiness and mental depression, and is the cause of advice being sought.

The *treatment* of these phantom tumors requires to be carried out with care and patience. Where there is any chronic inflammation or irritation about the uterus or ovaries, the morbid state must be removed according

* Medico-Chirurgical Transactions, vol. xxvii, p. 468. London, 1844.

to the rules which are laid down in the subsequent pages of this volume. Until the uterine functions are naturally performed, it will be useless to hope for much benefit. Then the general health is to be improved, which can generally be effected by the employment of bark and one of the mineral acids, or of ferruginous tonics, or of zinc with strychnia or nux vomica, and of mild aperients. A good nourishing diet must be allowed, while the power of the digestive organs is to be restored by pepsin or other drugs. It will often prove of great advantage if the patient can be sent to the sea-side. The nature of the case ought to be fully explained to her, while she must be led to feel confidence in the ability of her physician to effect a perfect cure. And lastly, the abdominal muscles are to have their abnormal irritability removed by the frequent use of galvanism, by shampooing, by giving support to them with a well-adjusted belt, and by the employment of tepid salt-water baths.

PART XI.

DISEASES OF THE URINARY ORGANS.

UNDER this head it is proposed to treat of the diseases of the ureters, kidneys, suprarenal capsules, and bladder.

I am not aware that disease of the *ureters*, occurring primarily, has ever been diagnosed during life. After death one or both of these canals are not unfrequently found considerably dilated (perhaps to the size of the small intestine), or much contracted. Both these conditions may be due either to some congenital malformation, or to the pressure of morbid growths, or to obstruction from an impacted calculus or an entozoon, or to the extension of disease downwards from the kidney or upwards from the bladder. One remarkable case of *hydronephrosis* [Ὕδωρ = water + νεφρός = the kidney], or dropsy of the kidney, has been recorded by Rokitansky, and another by Kussmaul, in both of which the right ureter had become obstructed, owing to compression by an irregular branch of the renal artery. This form of sacculation or dropsy of the kidney, the result of obstruction by calculi, tubercular, or malignant deposit, the pressure of tumors, &c., is not so very uncommon. The hydronephrosis is usually single, the obstruction occurring in only one ureter; but it will be double in the event of the obstructing medium being of such a nature that it influences both ureters. In the latter cases the mischief most frequently consists of an impervious urethra, so that the bladder, ureters, and pelves and calyces of the kidneys all undergo dilatation. Children thus malformed, if born alive, only survive a few days, unless the canal of the urethra become pervious, as it may, and then life can be prolonged for some time. Dr. Hillier has reported the interesting history of a boy who for five years derived relief from the repeated tappings of a congenitally dilated kidney. So considerable had been the distension of the pelvis of the kidney, and so great the resulting abdominal enlargement, that the case was at first mistaken for ascites. The boy, when between eight and nine years of age, died (in 1869) from acute tuberculosis. The right kidney was found converted into an enormous cyst, containing more than five pints of urinous fluid. Two remarkable cases of hydronephrosis have also happened, in which the cysts have been diagnosed as ovarian, and death has occurred from attempts at extirpation. The *first* was a patient of Dr. Baum of Göttingen, and was operated upon on November 28, 1864. Twenty-five pints of fluid were removed from the cyst, and it was then tried to draw out the latter, a proceeding found to be impossible, owing to the adhesions between the cyst and the transverse and descending colon. She died at the end of about fifty hours. At the autopsy the left kidney was found to form the tumor. In the *second* instance it was likewise a cystic development of the left kidney, which several gentlemen regarded as an ovarian

growth. Mr. Spencer Wells operated on January 3d, 1867. About fifteen pints of pea-soup-looking fluid were withdrawn from the cyst, but this structure could not be extracted in consequence of its adherence to the intestines and abdominal wall, &c. Death took place thirty hours afterwards. An examination afterwards revealed the true nature of the disease, the renal cyst being the size of an adult head.

The kidneys are ovoid bodies, deeply situated one on each side of the vertebral column, in the lumbar region. Each gland receives blood from the aorta by the renal artery. From this blood, as it flows through the kidney to be carried back by the emulgent vein into the inferior vena cava, the ingredients of the urine are separated or formed; this being done by the cells lining the straight and convoluted uriniferous tubes, as well as by those of the flasklike dilatations of these tubes which invest the Malpighian tufts of bloodvessels. Occasionally, the trunk of one renal artery is blocked up by an embolus, or its canal is nearly obliterated by some malformation or the pressure of a tumor; under which circumstances the corresponding kidney undergoes degeneration, and has its work performed by the opposite gland. The effects of suppression of urine (*ischuria renalis*) when both glands cease to act, have already been described in the section on uræmia. Each kidney is about four or five inches long, and two broad; the weight varying between four to six ounces.

From time to time subjects are met with in which there are three kidneys, and I believe that four have been discovered. When the number of these glands has been natural, their situation has, in a few instances, been found to be unnatural; both kidneys having been seen lying close together on the left side. A more frequent abnormality is the presence of only one kidney, which seems to be placed indifferently on the right or left side, and is generally more or less enlarged—perhaps very considerably, so as to weigh four, or even five pounds; while it may possibly have two ureters, and either one large renal artery and vein, or two or three arteries and the same number of veins. Again, the two glands are now and then united together; the junction occasionally being formed by a flat band of true renal tissue extending across the vertebral column, producing the so-called "horseshoe kidney." Sometimes the fusion of the two organs into one is still more complete; and then a large kidney is found lying in the median line, rather than in one of the lumbar regions. And besides, one kidney may occupy its normal site, while the other is movable; or, in a very few instances, an extreme mobility of both the glands has been found. The movable organ can be detected, feeling like a tumor; it may generally be shifted, to a certain degree, downwards and forwards; and compression with the hand usually gives rise to a peculiar faint or sick sensation. Lastly, the infant born dead at the full term, as well as the prematurely expelled fœtus, has been found destitute of any kidneys, on several occasions; while one almost incredible case has been recorded by Dr. Moulon,* physician to the Hospital at Trieste, of a girl living to be fourteen years of age, who had neither kidneys nor ureters nor urinary bladder. In this extraordinary instance, the liver was supposed to act vicariously; inasmuch as the umbilical vein proved to be enlarged, and there was a constant dripping of urinous-smelling fluid from the umbilicus, which was situated just above the mons Veneris. The girl died from causes independent of her anomalous structure.

Amongst the curiosities of medical literature must be placed the report of a case in which the right kidney was removed by operation.† The pa-

* Archives Générales de Médecine, tome xvii, p. 424. Paris, 1828.

† The Medical and Surgical Reporter, p. 126. Philadelphia, 1861. Quoted from the Gazette Hebdomadaire de Médecine et de Chirurgie, tome ix, p. 92. Paris, 1862.

tient, fifty-eight years of age, had the misfortune to have a large semi-solid tumor in the right hypochondrium, attached by a pedicle. His urine was albuminous, and had been so for the six years during which the growth had existed. Dr. Wolcott diagnosed a cystic tumor of the liver! On June 4th, 1861, this practitioner made a long incision over the prominent body, ligatured the pedicle, and removed the tumor. An examination showed that it consisted of the kidney, affected with encephaloid cancer; its weight being about two pounds and a half. The man died, fifteen days after the operation, from the exhaustion caused by profuse suppuration.

I. SUPPURATIVE NEPHRITIS.

Suppurative nephritis [from *Νεφρὸς* = the kidney; terminal *-itis*], or acute inflammation of the substance of the kidney, sometimes sets in without any appreciable exciting cause, especially, perhaps, in strumous subjects. More frequently it arises from exposure to cold and damp, from the formation of calculous matter, from various mechanical injuries, from poor living combined with intemperance, and from the abuse of diuretics; as well as from the administration of such renal irritants as copaiba and cubebs, cantharides and oil of turpentine, &c. It is comparatively a rare disease. As in inflammation of other organs, so in the kidney the morbid action may end in resolution, or it will go on to suppuration; in the latter case abscesses of a variable size resulting, which sometimes cause entire destruction of the gland. In most examples of nephritis, the mucous membrane lining the pelvis and infundibula is involved in the disease; inflammation of this tissue being known as *pyelitis* [*Πύελος* = a trough; terminal *-itis*].

The *symptoms* of nephritis are chiefly these: Deepseated pains in the loin on the affected side, more especially in the region of the kidney; the pain sometimes extending along the ureter to the neck of the bladder, or to the groin or scrotum or testicle, and being increased by pressure or by exercise. There is often also numbness of the thigh; and, in men, retraction of the testicle on the affected side. In addition, there is much constitutional disturbance,—usually indicated by shivering, fever, nausea, and vomiting, with great thirst; a hard, frequent, and full pulse; as well as by constipation and tympanites. Occasionally complete suppression of urine takes place; but more commonly, though the desire to empty the bladder is frequent and urgent, yet the secretion is scanty and high-colored, and often contains blood and free pus-corpuscles. These pus-cells may also be entangled in fibrin, being moulded into purulent casts of the uriniferous tubes.

The *prognosis* during the acute stage is always grave; while if this period be survived, there is still great risk from the changes produced in the glandular structure. The morbid action, if severe, may cause death by the general constitutional disturbance which it sets up. Sometimes it proves fatal at an early stage, by inducing coma; owing to the retention of urea in the blood, and the consequent poisoning of the system. In other examples, again, typhoid symptoms appear, and the patient gradually sinks from pure exhaustion.

The *termination* of the inflammation in suppuration is much to be feared. If, fortunately, the mischief should end in resolution, the sufferer appears to get well; although the gland is often left somewhat indurated, and thus

perhaps is laid the foundation for future disease. But where one or more abscesses form, then they lead frequently to ulceration, perforation of the capsule, the formation of renal fistulæ, and the establishment of a purulent discharge; these consequences being accompanied by a prostrating hectic fever, which most times ends fatally after a longer or shorter interval. In a few more favorable cases, however, the pus passes out by the natural passages, and is found in the urine; not unfrequently continuing to be thus discharged for months or even years, before a complete cure (or death) takes place.

Renal abscess is sometimes a secondary affection. Thus the irritation produced by a calculus in the pelvis of the kidney, will prove a frequent cause of suppuration. It may arise from long-continued obstructive diseases of the urinary passages,—as chronic stricture of the urethra,* enlarged prostate, tubercular or malignant disease involving the ureter, &c. There are also grounds for believing that it may result from purulent absorption.

The *diagnosis* requires care, lest the suffering from congestion and inflammation be confounded with that which arises from mechanical irritation of the kidney, perinephritis, spinal disease, or lumbago. Now touching irritation of the kidney from a stone—calculous nephralgia—the symptoms of this closely resemble those just described. But as the calculus passes along the ureter to the bladder, the local suffering is much greater than in nephritis, while the systemic disturbance is less. The sudden relief which follows the entry of the stone into the bladder, will reveal the

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* A well-marked example of this fact has been reported by Dr. W. Rutherford. The case—an epitome of which is now given—is really instructive; not only as showing the origin, but also the progress and termination of some forms of renal abscess: A young soldier of the 18th Regiment, in due course of service proceeded to India; from whence after nearly three years, he was invalided to England owing to repeated attacks of dysentery and intermittent fever, with an obstinate stricture of the urethra consequent upon a long-continued gonorrhœa. After treatment at Chatham, he returned to his regiment at Buttevant, on June 27th, 1861. On September 17th he was admitted into hospital on account of intermittent fever and stricture. He complained of great pain, straining to pass urine, and rigors. The urine came away "guttatim;" all attempts to pass a catheter failing until October 9th, when a very fine catheter was got into the bladder, and a considerable quantity of urine drawn off. There was difficulty of micturition afterwards, but no positive retention; the quantity of urine seemed natural, it contained mucus, was alkaline, but at no time could any pus be observed in it. On October 16th a tumor was found in the hepatic region; it rapidly increased in size, there were daily rigors, and symptoms of a typhoid character set in. On the night of October 26th, a sudden discharge of purulent matter took place by the mouth. On October 27th an incision was made into the tumor, and a small quantity of thick grumous pus evacuated. Afterwards ten or twelve ounces of pus escaped daily from the wound; the amount expectorated diminishing until the 28th, when it ceased. Death occurred on October 29th. There was intense pain in the seat of the abscess to the last.

At the *autopsy*, a considerable portion of the lower lobe of the right lung was found connected by recent adhesions to the diaphragm; the pulmonary parenchyma being infiltrated with pus. On detaching the lung from the diaphragm an abscess was discovered; it communicated superiorly with the bronchial tubes, laterally with the external abscess which had been opened, and inferiorly through an opening in the diaphragm with an abscess in and around the right kidney. This gland was found buried in a mass of adhesions, mixed up with purulent matter; the cortical substance contained a number of small abscesses; one of which, the size of a hen's egg, communicated with the collection of matter in the surrounding areolar tissue. Some of the abscesses communicated with the calyces or pelvis of the organ. The left kidney also contained several small circumscribed abscesses in the cortical structure, about the size of peas. There were no calculi. The structure of the liver proved to be healthy. A close, semi-cartilaginous stricture was found in the membranous portion of the urethra, through which a small silver probe could scarcely be passed.—Statistical, Sanitary, and Medical Reports for the Year 1861. Army Medical Department, p. 479. London, 1863.

true nature of the attack when there has been any doubt. Then in respect to perinephritis [*Περὶ* = around + *νεφρὸς*; terminal *-itis*], and spinal disease, the symptoms are less acute, come on much more insidiously, and give rise only to pain in the affected part; the bladder seldom being irritable, while there is no retraction of the testicle. And so with regard to lumbago, we find neither nausea nor vomiting, the appetite remains unaffected, the bowels are not constipated, and there is no fever. Furthermore, the urine does not contain renal casts, nor albumen, nor pus; although it may be loaded with urates.

On making an examination of the urine for pus, reliance is partly to be placed on the evidence obtained by the microscope, and partly on that derived from a chemical analysis. Pus-corpuscles are round, pale, granular, and indistinctly nucleated. Under the influence of a drop of dilute acetic acid they lose their granulated appearance, swell considerably, and have their nuclei made much more distinct. An instrument with a $\frac{1}{4}$ inch object-glass will suffice for the examination, though the $\frac{1}{8}$ of an inch glass is better. The best test for pus is the solution of potash (KHO according to the new method of notation), on the addition of which a muco-gelatinous mass is formed, more or less viscid according to the proportion of the abnormal ingredient. Nitric acid (HNO_3) also shows the presence of a small quantity of albumen, which is derived from the serum of the pus. The fact must not be overlooked, however, that the detection of pus in the urine is by no means a proof that the secreting structure of the kidney or its pelvis is affected; for the purulent matter may be derived from the mucous lining of the urethra, bladder, or ureters. In women suffering from leucorrhœa a small quantity of pus is often found, which has its origin in the lining coat of the vagina. Moreover, an abscess situated in other parts occasionally bursts into the urinary passages; as examples of which can be mentioned a psoas abscess opening into one ureter, the pus in pelvic cellulitis making its way into the bladder, a prostatic abscess discharging its contents into the urethra, &c.

The *treatment* of nephritis ought to consist in the use of poultices or fomentations to the loins, frequent hot hip-baths medicated with extract of poppies, the vapor or hot-air bath, mild purgatives, and diaphoretics—especially those containing opium, such as the compound powder of ipecacuanha made with the nitrate instead of the sulphate of potash. Our object, indeed, should be to rest the inflamed gland, and to get its work done by the skin and by the mucous membrane of the bowels. Among the various purgatives few will answer better than the resin of jalap, two or three grains of which, with half a grain of the resin of podophyllum, will usually act well in spite of the constipating effect of the opium. The patient had better be kept warm in bed; his diet ought to be low, with a free allowance of simple diluents, while if there be urgent sickness, sinapisms may be applied to the epigastrium and ice given to suck.

As soon as symptoms of prostration set in, or immediately there are any indications of suppuration, support must be had recourse to. Milk, cream, raw eggs, essence of beef, cod-liver oil, and the liquid extract of bark, are all of great service. Solid food is to be freely allowed directly there is sufficient power to digest and assimilate it.

II. ACUTE BRIGHT'S DISEASE.

During the year 1827 Dr. Richard Bright first pointed out the frequent connection of anasarca and other dropsical affections with albuminuria and a degeneration of the structure of the kidneys, the prominent character of which degeneration was believed to consist in the deposition of a peculiar granular matter in the substance of the renal gland, together with the gradual atrophy of its cortical and tubular structure. Since this time the pathology of these diseases has engaged the attention of several of the most distinguished workers in the profession; the revolution which has taken place in our views concerning albuminuria and its causes being due to the chemical and microscopical investigations, as well as to the clinical studies, of Bowman, Christison, R. B. Todd, John Simon, George Johnson, Owen Rees, Virchow, Parkes, Goodfellow, Basham, George Harley, Begbie, Rosenstein, Wilkes, William Aitken, Lionel Beale, W. H. Dickinson, and Grainger Stewart. To perpetuate the honorable name of the physician who originally proved the association of renal disease with albuminuria and dropsy, the Fellows of the Royal College of Physicians of London have decided, by their Provisional Nomenclature Report, that all kidney diseases which are productive of albuminuria shall be classed together under the head of Bright's disease. Of this there are, as will now be explained, two forms—the acute and chronic; the latter including three distinct affections.

Acute Bright's Disease, or acute albuminuria, or acute desquamative nephritis, or acute renal dropsy, or acute tubal nephritis, is a very important disorder which may originate from several causes—as intemperance, starvation, exposure to wet and cold, erysipelas, and the cholera poison, &c.; but especially is it often due to scarlet fever.

Pathology.—The circulation of unhealthy blood through the kidneys must impair the renal cells, whether the blood be altered by the constant presence of alcohol, or by injurious matters generated within the system, or by the poisons of the eruptive fevers. Now acute Bright's disease consists essentially of an affection of the epithelial or gland cells lining the convoluted uriniferous tubes, induced by their having to eliminate from the blood some matter which is not naturally excreted by the kidneys; or, if natural, is present to a morbid excess. The cells, having their functions thus modified, suffer changes as regards their nutrition; they become atrophied and disintegrated; while from their rapid desquamation they tend to check secretion by mechanically obstructing the tubes. During the time that the gland-cells are undergoing these changes the materials which ought to be withdrawn from the system by the kidneys are more or less retained, their accumulation in the blood increasing its deterioration, so that this again aggravates the original mischief. The circulation through the vessels of the Malpighian tuft also becomes impeded, and consequently an effusion of serum and fibrin takes place into the cavities of the tubes. The serum which exudes from the congested Malpighian capillaries mingles with the urine and renders this fluid albuminous; while the fibrinous material solidifies, entangles in its substance the cast-off epithelial cells, and escaping with the urine is detected in this secretion in the shape of epithelial tube-casts. If any of the walls of the vessels give way, as they will do under the influence of the pressure to which they are exposed, blood-corpuscles will also be found entangled in the casts, while the urine will present a dark-colored sediment. In the event of the disease terminating fatally, both kidneys will be found much congested. They are usually con-

siderably increased in size and weight, are of a pale-yellow or even cream-colored hue, and are marked with irregular extra-vascular patches. Minutely examined, the convoluted tubes of the cortical portion of the gland are seen to be widened and crowded with desquamated epithelial cells, with blood-corpuscles, and with amorphous granular matter; some tubes being more distended than others, and having their channels completely blocked up. The straight tubes of the medullary cones are comparatively unaffected. The Malpighian bodies are found engorged.

Every now and then it happens that the subject of general dropsy with albuminuria has no desquamation of the renal epithelium; just as cases of scarlet fever, small-pox, &c., are met with in which the eruption is very slight or entirely absent. In these examples of *non-desquamative disease of the kidney*, there are often prominent symptoms of blood-poisoning; owing as Dr. George Johnson has shown to some failure and imperfection in the effort to eliminate the morbid material from the system.

A few years since, Dr. Basham expressed his doubts as to the correctness of the terms desquamative and non-desquamative nephritis. He suggested, as more applicable, the names of acute and chronic albuminous nephritis: or (out of respect to the distinguished physician who first discovered this form of disease) that of morbus Brightii in its acute or chronic form. Dr. Basham well remarked that this copious shedding of epithelium is common to all free epithelial mucous surfaces, when they are the seat of inflammatory engorgement or irritation; and that consequently we might as reasonably speak of desquamative bronchitis, or of desquamative catarrh, as of desquamative nephritis.* Allowing the justice of these observations, it might still have been urged that the mechanical consequences of the desquamation are so much more serious in the case of the kidneys than of the bronchi, that extra attention could well be fixed upon the occurrence in the former instances. The difference between catarrhal inflammation of a mucous surface which is free and one which lines minute complex canals, must be obvious to every one. In the first case, there is no trouble in the membrane getting rid of any quantity of cast-off cells and morbid secretions: in the second, these products can only be eliminated slowly and with difficulty, while by their presence and accumulation they are obstructing important passages and embarrassing the action of the whole gland. The soundness of this plea, I venture to think, remains good, even though it be rendered unnecessary owing to Dr. Basham's views having been adopted by the London College of Physicians. And since the advantages of one uniform system of nomenclature are obviously so great, it cannot be wise to be hypercritical as to the names employed, provided we are all agreed about the nature of the diseases to which they apply.

Symptoms.—As a general rule, acute Bright's disease is ushered in with rigors and chilliness. These symptoms are soon followed by feverish reaction, headache, restlessness, a sense of weight or dull pain with tenderness in the loins, and nausea or even vomiting. The dropsy which it gives rise to is an early symptom: the face first becomes puffy, followed by general swelling of the connective tissue throughout the body, and by effusion of fluid into the pleurae or one of the other serous cavities. In extremely rare instances there is no dropsy; the absence of this being due, according to Dr. George Harley, to only one kidney being attacked. So long as one gland can act and prevent the accumulation of urinary materials in the blood, dropsy does not set in. Whether, however, any anasarca be present

* On Dropsy connected with Disease of the Kidneys (Morbus Brightii), &c. Second edition, p. 20. London, 1862.

or not, there is a frequent desire to pass urine; which is usually very scanty, of a dark smoky color, and on being tested by heat and nitric acid proves to be highly albuminous. Examined microscopically, it is seen to contain masses of coagulated fibrin, epithelial casts and cells, blood-corpuscles, and occasionally crystals of uric acid. The epithelial casts and cells sometimes inclose a small quantity of fatty matter; but this circumstance need not lead to an unfavorable prognosis unless a large proportion of the cells are seen distended with oil, when it must be feared that the kidney is passing into a state of fatty degeneration. The more acute and extensive the renal mischief, the greater is the diminution in the amount of urine; while of course the risk of blood-poisoning and fatal coma becomes proportionately considerable. Such cases are, however, the exception; recovery being the rule.

The earliest signs of improvement are a more natural appearance of the urine to the naked eye; a diminution of the albumen and renal epithelium; and an increase of all those urinary constituents which have been previously lessened,—the water and urea and chlorides especially. As such increase takes place, the dropsy quickly diminishes. It is not uncommon for a patient during convalescence from this disease, to pass from four to six pints of urine during the twenty-four hours; the natural quantity averaging only from two to two and a half or three pints.

The very unfavorable phenomena which follow a suppression of the functions of the kidneys have already been described (p. 39). It may, however, be remarked, that when the blood becomes loaded with urea a strong urinous odor is often to be detected in the perspiration, in the breath, as well as in the matters vomited. In one marked case of uræmic toxæmia, occurring after scarlet fever, which I saw in consultation with Mr. Kingsford of Sunbury, a large linseed poultice applied over the loins gave out a sickening and very disgusting smell; the effluvium being so powerful that it pervaded a large house. This stench was more abominable than anything I had ever smelt before; and it served to prove that the blood was highly contaminated. According to Dr. Thudichum, one of the principal features of uræmia is the retention in the blood of the coloring matter of the urine —urochrome. This urochrome, so retained, undergoes decomposition, and yields uropittine and omicholic acid; which, circulating with the blood, vitiate all the tissues and taint the secretions.*

The curious circumstance that acute desquamative nephritis from scarlatina is more frequent after a mild than after a severe attack, is probably explained by the want of caution which is often observed in such cases during the period of desquamation. The patient gets exposed to cold, and immediately the escape of the fever poison through the pores of the skin is checked; which poison, as a consequence, is directed to the kidneys in larger quantities than they can bear. The disorder usually commences somewhere about the twenty-second day from the setting-in of the fever.

Diagnosis.—The preceding observations leave nothing to be noticed under this head, except as to the presence of *albumen* and *casts* of the tubes in the urine. Now it must be remembered that the former substance, though very frequently, is not always the result of temporary or permanent disease in the secreting structure of the kidney. On the contrary, it may originate from a depraved or unduly watery condition of the blood; from some transient congestion of the renal capillaries, the consequence of cold, or of an eruptive fever, or of inflammation of some internal organ; from passive portal congestion consequent upon long-standing cardiac or hepatic disease;

* British Medical Journal, p. 519. London, November 5th, 1864.

from lesions or reflex irritations of the nerve-fibres that regulate the calibre of the renal bloodvessels, such as happen sometimes in hemiplegia and paraplegia; from diseases of the pelvis of the kidney, or of the ureter, or of the bladder, or of the urethra; as well as from pressure upon the vena cava, or on the emulgent veins of the kidney, by an abdominal tumor, by a pregnant uterus (?), or by disease in the connective tissue surrounding the kidney. Nevertheless, when albuminuria is long persistent, we may be sure that it is associated with organic disease of the kidney. Under these circumstances, a minute examination of the urine reveals the presence of casts,—moulds of the tubes taken in some coagulable material. As this matter is effused, it entangles in its structure the contents of the tube. Hence we have several kinds of casts,—the waxy or fibrinous, the fatty, the epithelial, the granular (consisting of disintegrated epithelium), the bloody, &c.

When analyzing the urine for albumen, two tests must be employed—heat and nitric acid (the officinal acid suffices, the formula for which, on the new system, is HNO_3). On applying heat, 150° to 175° Fahr., to albuminous urine in a clean test-tube, the albumen coagulates and produces a cloud varying in density. This cloud commences at the part of the tube nearest the heat, and can be seen to gradually extend through the fluid as the boiling-point is gradually approached. Coagulation only takes place, however, when the urine is acid; for alkaline, or even neutral, urine may be loaded with albumen, and yet heat will produce no deposit. In such a case the secretion must be rendered acid by the addition of nitric acid until the deposit is thrown down; heat being then applied to make sure that the precipitate remains unchanged. It does not answer merely to add a drop or two of acid and then to apply heat, for under these circumstances the urine may be loaded with albumen and yet no deposit be formed; a circumstance that Dr. Bence Jones has supposed to be due to the formation of a nitrate of albumen, which is soluble in a weak and even boiling solution of nitric acid, but is insoluble in a more acid mixture. This explanation has seemed unsatisfactory to Dr. Beale; who concludes from some experiments that a trace of nitric acid prevents the coagulation of a moderately strong solution of albumen by heat, in consequence of its decomposing the phosphates and setting free phosphoric acid in which albumen is soluble. When an excess of nitric acid is added, its action overpowers that of the phosphoric acid, and albumen is precipitated. The nitric seems preferable to the acetic acid ($HC_2H_3O_2$), which is sometimes recommended for acidulating neutral or alkaline urine; because an excess of the vegetable acid dissolves albumen during boiling. Moreover, heat alone must not be trusted to in any case, since it renders the urine cloudy when there is an excess of earthy phosphates; this cloud being dissolved by nitric acid, while the albuminous deposit continues permanent. Again, nitric acid alone may give rise to turbidity, owing to the decomposition of the urates held in solution, and the precipitation of amorphous uric acid: the latter being decomposed, and the urine rendered clear though of a brown tint, on using heat. It may be worth remembering, also, that the use of copaiba, or of cubebs, sometimes produces in the urine a substance which is precipitated by nitric acid, and which thus looks like albumen.

In order to form a rough and ready estimate of the quantity of albumen passed in the urine, we may note the proportion of sediment to clear urine after boiling and settling in the test-tube, such as three-fourths, or one-half, or one-fourth, or one-eighth, and so forth. This is better than Dr. Christison's seven degrees of coagulability; and more exact than the plan I have long adopted of such a quaternary division as the following: (1.) Completely coagulable by heat, the albumen occupying nearly the whole quan-

tity of urine boiled. (2.) Strongly coagulable, half the quantity. (3.) Moderately coagulable, a fourth of the quantity. (4.) Slightly coagulable, only a hazy appearance, undistinguishable from a deposit of phosphates until after the addition of nitric acid.

Prognosis.—This may generally be favorable. The chief points to be feared are the occurrence of uræmic epilepsy or coma, owing to suppression of the functions of the kidneys; or the setting up of acute inflammation in one of the serous membranes, or in the air-tubes, or in the lungs; or of uncontrollable sickness or diarrhœa being induced. There is likewise some risk lest abundant effusion into the pleuræ or pericardium should prove fatal; as well as of apoplexy happening from effusion into the cerebral ventricles, or into the meshes of the pia mater. Another rare cause of death is the formation of a thrombus or clot in the pulmonary artery. Assuming that these dangers are avoided or got over, there must still be felt some anxiety lest permanent structural disease of the gland should set in. Care ought to be taken not to discontinue treatment until the urine is found by chemical and microscopical examination to be quite healthy.

Treatment.—In seeking to cure acute inflammation of the kidney, we have to remember—as Dr. George Johnson remarks—"that there has been, first, a morbid condition of the blood, which has excited disease in the kidney; and that, as a secondary consequence of the renal disease, the blood has become contaminated by the retention in it of urea and other excrementitious matters."* Our double object must, therefore, be to rest the affected glands, while we purify the blood by means of the other excretory organs. To carry this plan into practice, the patient ought to rest in bed, in a moderately warm room, and be placed on milk diet; at the same time allowing him an abundance of simple drink, water, tea, or barley-water. In order to get the skin and bowels to act freely, the hot air or hot water bath (F. 119, 130) must be used once daily for three or four times; while diaphoretic medicines (F. 209, 211, 217) are to be administered, together with saline or other purgatives (F. 141, 151, 160, or 169). In many instances, elaterium (F. 157), given so as to produce free purging, is very beneficial; but for children I usually prefer the compound jalap powder, in doses varying from fifteen to forty grains. Dry cupping over the loins often seems to be useful; or a few leeches may be applied, using hot fomentations or large linseed poultices for many hours subsequently. Powerful diuretics should never be had recourse to in this disease; since in the early stages they do great mischief, while in the latter they are unnecessary. Supposing a drug of this class to be needed, however, not one can compare with digitalis; inasmuch as it acts well without irritating the kidney. Where symptoms of uræmic toxæmia set in, the remedies already mentioned (p. 44) are to be resorted to.

Directly the feverish phenomena have subsided, attempts ought to be made to improve the quality of the blood, as well as to diminish the escape of the albumen, by the administration of steel; no preparation answering this double purpose better than the tincture of perchloride of iron (F. 392). At the same time, the patient can be permitted to leave his bedroom, though he is to be confined to the house. He may have tender animal food, with plenty of milk, and one or two raw eggs daily. Spirits and beer had better be avoided; while wine, freely diluted, ought only to be allowed if it seem really required. Under this treatment the dropsy will completely subside, while the albumen and tube-casts gradually diminish until none can be detected

* On Diseases of the Kidney, p. 126. London, 1852.

in the urine. It is always advisable to examine the latter, both chemically and microscopically, every few weeks for some time after a cure appears to have been effected.

Moreover, the patient will have to clothe warmly, wearing flannel next the skin; while he must long avoid exposure to cold and damp.

III. CHRONIC BRIGHT'S DISEASE.

Chronic Bright's disease, or chronic albuminuria, is a generic term for three very different renal affections which are accompanied by one prominent symptom—the presence of albumen in the urine. There is likewise a tendency to dropsy, with various secondary tissue degenerations. The diseases of this class are (1) The granular kidney; (2) the fatty kidney; and (3) the lardaceous kidney.

1. GRANULAR KIDNEY.—This disease has several synonyms,—the contracted granular kidney, the gouty kidney, the cirrhotic kidney, and chronic desquamative nephritis. Under the latter name it was first minutely described by Dr. George Johnson;* and to his researches we are consequently greatly indebted.

The granular or cirrhotic kidney is most frequently met with in the male sex; it is very rare before the age of thirty; it is sometimes associated with cirrhosis of the liver, and, perhaps, with thickening of the capsule of the spleen; and it is a morbid condition which comes on very gradually.

The disease is characterized by a long-continued shedding of the renal epithelium, which appears in the urine in a more or less disintegrated state. The tubes gradually lose their epithelial lining, and subsequently are atrophied or filled with a new material; while the connective tissue of the gland becomes hypertrophied, and all the other structures waste. The renal bloodvessels undergo changes; the coats of the smaller arteries especially getting thickened, while the capillaries become contracted and many of them impervious. The entire kidney becomes small and wasted and indurated: the Malpighian bodies seem to atrophy. Cysts are often seen in the cortical substance. The urine is, for the most part, albuminous; while it is unusually greater in quantity and of a less density than in health, varying from 1005 to 1015. If we examine it microscopically, we shall find abundant amorphous granular matters, either scattered or in the form of cylinders, which have evidently come from the renal tubes, and which are known as *granular epithelial casts*.

The disease is frequently a consequence of chronic gout (Dr. Todd used to speak of it as the *gouty kidney*), or of some allied disorder of the general health; it will, perhaps, be the product of a long-continued course of dissipation, with abuse of intoxicating drinks; while it may happen as a result of chronic congestion of the venous system, such as is met with in cardiac valvular disease. In some instances it comes on so insidiously, that unless the urine be examined it may escape detection, until, perhaps, the patient is seized with a fatal attack of suppression and uræmia.

After death the kidneys are found contracted—possibly to less than half

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* Opus jam citat., p. 168. Also, Medico-Chirurgical Transactions, vol. xxx, p. 165. London, 1847.

their natural size, according to the length of time the disease has existed. Their surfaces are uneven, and, perhaps, puckered; their fibrous capsules are thickened and morbidly adherent, so that they cannot be cleanly peeled off, while their cortical portions especially are shrivelled.

This affection produces great changes in the blood, and many and various constitutional disorders consequent upon these changes; amongst which the most frequent are anasarca, dropsy of one or more serous cavities, inflammation of the serous membranes, hypertrophy of the heart—with or without disease of the valves, and lastly, either structural changes, or great functional disturbances of the nervous centres.

To speak rather more in detail, granular nephritis will possibly exist for some time without producing any marked *symptoms;* or the renal disease may be masked by the progress of some pre-existent and causative malady. Thus, I have seen instances of chronic gout where the disease of the kidney has become far advanced without having manifested itself by any special signs; and hence in all such cases the urine should be frequently tested. On the other hand, many examples of this form of nephritis are attended with failing health and strength; the skin is harsh, dry, and sallow; the appetite is variable, sometimes bad, at other times voracious; there may be dyspepsia, mental depression, rheumatic pains, or some pulmonary derangement; and in several instances there have been frequent attacks of bleeding from the nose, and even of gastric or cerebral hemorrhage. Impairment of vision is common in this, as in other varieties of chronic kidney disease; the changes in the vessels and nerve-tissues of the retina sometimes progressing to such an extent as to cause total blindness. By the use of the ophthalmoscope in nephritic retinitis, effusions of serum or of blood have been found between the fibrillæ of the nerves.

As the renal mischief progresses, the patient loses flesh; but such a loss may be concealed by the anasarcous swelling of the body, though dropsy is, by no means, a constant feature of this affection. Indeed, many cases prove fatal without the occurrence of dropsy in any form; while in others there will, perhaps, be merely a puffiness about the face and eyelids, with slight swelling of the ankles. Sickness is sometimes troublesome, but diarrhœa is uncommon. The urine is larger in quantity, and is passed more frequently than in health; and especially has the patient to rise once or oftener in the night to empty the bladder. On testing this fluid it may be found of normal color, reaction, specific gravity, and free from any blood; while where the disease is in an early stage there need not necessarily be any albumen. But, in all instances, if the secretion be allowed to stand, and the sediment be minutely examined, the microscopist will detect a granular material in small masses, and coarse opaque cylinders; which consist of disintegrated epithelium from the basement-membrane of the tubes, washed out with urine. As the disorder advances the epithelium becomes shed more abundantly, and the urine gets decidedly albuminous.

This affection often makes but slow progress, especially at first. Where it happens as a secondary disorder, the cure or retardation of the latter will have a very beneficial influence in mitigating the kidney complaint. But when it gradually advances, complications arise; the heart or lungs get diseased, the nervous centres become implicated, and convulsions or coma set in. Of course the *prognosis* must be partly regulated by the mode of living which the patient adopts, and the steadiness with which he will follow the rules prescribed for him.

With regard to the formation of *cysts* in the structure of the kidney there is much still to be learned. Probably they are produced in several ways. The principal are,—obstruction of tubes, from too rapid or abundant des-

quamation of the secreting cells, with dilatation of the portions above the plug; dilatation of tubes which have permanently lost their epithelial lining into cysts, in consequence of the basement-membrane continuing to be nourished and to secrete serum into their channels; and lastly, the wasting and disintegration of circumscribed patches of renal tissue causing small cavities. When the tubes get obliterated near the Malpighian bodies, the vessels will probably waste, while the flasklike terminations of the tubes become expanded and transformed into cysts. In whatever manner produced, these simple cysts are found to be few and scattered, or very abundant; while they can either be of considerable size, or so minute as to be invisible to the naked eye. In adults it is far from uncommon to find numerous small cysts, which are filled with limpid colorless serum. Now and then the whole of the gland appears to be converted into a congeries of these sacs. This has been found to be the case in the new-born infant. Thus, in April, 1857, Mr. J. Jardine Murray delivered a half-witted girl of a monstrous child in the Royal Maternity Hospital of Edinburgh. The labor was tedious, considerable force being required to extract the greatly enlarged abdomen of the child after the head and arms had been expelled. The cause of this enormous size proved, on dissection, to be a cystic disease of the kidneys. Both kidneys were equally affected. The right weighed very nearly 14 oz. Its vessels and ureter were normal in size and appearance; the external surface was smooth. On making a section of the organ, the whole substance seemed to consist of pearly cysts containing serous fluid; their average size being that of a pea.*

The *treatment* of granular kidney, for the most part, resolves itself into the adoption of means for the removal of that morbid state of the blood and constitution generally, of which the renal affection is only a result and a manifestation. When the disease is the consequence of gout, we must regulate the diet—disallowing sugar and all fermented liquors; attention should be paid to the various excretory functions; while such remedies ought to be employed as are indicated by the patient's general mode of life and state of health. Great benefit will always be derived from keeping the skin warm, and from the occasional use of the warm water, hot air, or vapor bath: diaphoretic medicines (F. 209, 211) are also useful. Gentle aperients; dry cupping over the loins frequently repeated, or counter-irritation to the same part by sinapisms, ointment of tartarated antimony, or ammonia liniments; quinine, iron, and other tonics—these are all remedies which often afford considerable relief. Mercurials, and especially all diuretic medicines, are strictly to be avoided.

In cases attended with *dropsy*, we may every now and then use those purgatives which produce copious watery stools, such as elaterium, gamboge, jalap, scammony, &c. (F. 151, 157, 158, or 168). Only exceptionally is there spontaneous diarrhœa; but if this should set in, it is not to be checked, unless it be producing exhaustion. Where there is much depression, as there usually is after a time, we must avoid drastic purgatives, and simply get the skin to act freely by the exhibition of some diaphoretic draught at bedtime; or especially by the use of the hot air bath, repeated every night, or on alternate nights. The mineral acids, with bark (F. 376), or salicin (F. 388), or steel and pepsin (F. 394), may temporarily impart a sense of renovation while cod-liver oil (F. 389), will often prove beneficial. The diet should be generous; with milk and eggs, and vegetables, white fish, and mutton, or poultry, or game, if such can be digested. A

* The British and Foreign Medico-Chirurgical Review, vol. xxvi, p. 509. London, October, 1860.

moderate quantity of wine can, perhaps, be allowed without detriment, if the patient have been much accustomed to alcoholic drinks; but in a large number of cases, I am sure it is better to dispense with all stimulants. Flannel drawers and waistcoats ought to be worn all the year round. Change of air, particularly a sea-voyage, often proves very valuable.

2. FATTY KIDNEY.—The epithelial cells of the kidney in health contain a small proportion of fat. Under the conditions now to be described, this proportion becomes abnormally increased.

There are two forms of fatty kidney; the gland being enlarged in one variety, and contracted in the other. The *enlarged pale and mottled kidney* is a result of subacute inflammatory action and fatty degeneration. In a typical example of this condition, the uriniferous tubes may be almost choked with oil-globules; the walls of the capillaries being also affected. This form of disease has been thought by several pathologists to be an early stage of the *fatty contracting kidney*, but it is most likely that the two conditions are distinct. Although it cannot be positively affirmed that the mottled kidney never undergoes atrophy, yet (as was remarked by Mr. Simon in 1847) in an infinitely large proportion of cases such a gland remains large and mottled to the end. According to Dr. Dickinson, the importance to be attached to a fatty condition of the renal epithelium has been much exaggerated: the epithelium though fatty for a time, may recover its natural characters. Certainly it has been known for several years, that in the domestic cat, as found in London, the tubes of the kidney are almost invariably loaded with oil. That this state is an abnormal one seems probable. Yet it does not seem to interfere with the action of the kidneys, or with the health of the animal.

Renal fatty degeneration is often seen in connection with some exhausting disease, such as tubercle or cancer. It also sometimes occurs during the wasting of old age. Fatty infiltration of the kidney—a state of fatty accumulation—may result from the excessive consumption of food rich in oily matter.

A fatty contracting kidney is a very serious form of disease, and one which is as sure to cause death as any other grave structural affection of a vital organ. The gland loses bulk and weight. The cells of the uriniferous tubes get loaded with oil-globules; while the latter, with degenerated cells, are also found free in the tubes, perhaps to such an extent as at parts to choke up the channels. The size of the tubes undergoes changes,—increased in one part, diminished in another. The coats of the small arteries become thickened and degenerated, as happens in most instances of chronic renal disease; while here and there the canals of these vessels are perhaps obstructed by small masses of fibrin—emboli, which have been carried in the circulation from the lining membrane of the heart or large vessels.

Fatty degeneration of the kidney may be the consequence of acute desquamative nephritis. According to some authorities it is really the second stage of this tubular inflammation. Fatty transformation, however, undoubtedly happens where no evidence of pre-existent inflammation can be traced. Sometimes it occurs in connection with fatty degeneration of the muscular fibres of the heart. It has been found frequently with fatty liver; and now and then after death from diabetes. Cases are not rare of its association with scrofula, or with the development of tubercular disease in the membranes of the brain, or in the lungs, or in the glands of the mesentery, &c. It also occasionally arises from the effects of one of the eruptive fevers, or from bad living, constant exposure to wet and cold,

intemperance, &c. Hence the renal textural changes are but the expression of that which no doubt primarily is a blood disease.

The appearances in the urine characteristic of this disorder are the following: A scanty secretion, which is highly albuminous and of low specific gravity. It is generally, in the early stages, free from sediment; and, when examined by the microscope, is found to contain neither renal epithelium, nor casts of tubes—or if any, only small waxy (hyaline) casts. After an interval which is variable in different cases, while the general characters of the urine remain unaltered, there appears a light and cloudy sediment. In this deposit there are usually discovered numerous granular casts, with perhaps some of the small waxy casts; while in these moulds are entangled globular or oval cells inclosing a considerable number of oil-globules, several of the cells being completely filled with oil, and presenting the appearance of dark opaque masses. Usually, several of the casts have adhering to their surface many small oil-globules, which have probably escaped from ruptured cells; while numerous cells containing oil, together with detached fat-globules, are scattered over the field of the microscope.

Where the urine is of a natural color, highly albuminous, of a low specific gravity and presenting a large number of oily casts and cells the *prognosis* is most unfavorable. Dr. George Johnson says that these appearances indicate as serious and intractable a malady as tubercular disease of the lung. He has examined the urine in a considerable number of these cases, and in no one instance did he find that this secretion regained its normal condition, or ceased to be albuminous. The patient's life may be prolonged by careful management, but he cannot hope to be cured.

The odor imparted to healthy urine by the digestion of asparagus must have been noticed by every one; while most practitioners are doubtless familiar with the smell of violets which the renal secretion gives off in patients who are taking turpentine, as well as with that of pepper when attempts are being made to check a gonorrhœa by cubebs. It has been stated by De Beauvais, that in albuminuria these effects are not produced: and from experiments which have been performed it would seem that, with a few exceptions, the observation is correct.

The chief *symptoms* produced by this disease are—gradually increasing debility; feeble action of the heart, with a frequent and irritable pulse; a striking pallor of the face, as well as of the skin generally, perhaps combined with puffiness of the former; a disposition to frequent micturition, the patient having to rise once or oftener in the night to pass water; and dyspepsia, with attacks of obstinate vomiting. Troublesome headaches are sometimes complained of, with dimness of sight and fits of vertigo. There is always a tendency to grave inflammations of the serous membranes—such as pericarditis, peritonitis, meningitis, and pleurisy; and occasionally to amaurosis, sometimes attacking both eyes, and perhaps due to fatty degeneration of the retina. Then we have anasarca of the limbs, with dropsy of the different cavities; in rare cases (unless there be coexistent heart disease, when such a result is more common) œdema of the lungs setting in suddenly, and rapidly producing serious dyspnœa; severe sickness and head symptoms and perhaps epileptic convulsions, probably due to the effects of the retained urea upon the nervous system; and ultimately coma, which soon ends in death.

Occasionally cases are met with where almost all these symptoms are wanting. A moderately healthy-looking individual has to rise two or three times in the night to micturate; he suffers from attacks of headache; and he perhaps complains of languor. There is neither great anæmia, nor loss of flesh, nor any dropsy. Perhaps he does not think it necessary to have

medical advice; so that the albuminous state of his urine, which is sure to be present, is not detected. Yet suddenly, while in what the friends regard as his usual state of health, he has a severe fit of epilepsy; from which he seldom if ever recovers. In fact, consciousness is not restored, and he dies in from eighteen to thirty-six hours.

In the *treatment* of the ordinary cases of fatty kidney, we can do little more than palliate the symptoms, and so hope to prolong life. The diet should be regulated; and abstinence from every kind of intoxicating drink, from starch and sugar, and perhaps from fatty articles of food, insisted upon. As a rule, there is considerable risk in administering any preparation of opium, where the urea is imperfectly eliminated from the blood; although in hopeless cases, when we find great irritability and restlessness, an opiate may be prescribed on the principle of choosing the least of two evils. Where the anasarca of the lower extremities is considerable, punctures should be made with a sharp-pointed lancet on the outside of the legs; afterwards wrapping the limbs completely in chamois leather. In other respects, the rules laid down in the preceding section must be attended to.

3. LARDACEOUS KIDNEY.—This disease comes on insidiously, and runs a sluggish course. It is most frequently met with between the ages of twenty-one and fifty, though not peculiar to any period of life; and it attacks both sexes nearly equally. At the end of a variable number of years, it proves fatal; the time being in a great measure dependent upon the presence or absence of any scrofulous caries, or of the tubercular or syphilitic cachexia, or of persistent suppuration.

To say much upon the general nature of this disorder would only be to repeat in a wearisome manner the remarks which have already (p. 159) been made. Suffice it therefore to notice that waxy, lardaceous, or amyloid degeneration of the kidney probably never exists alone. It is a constitutional affection; in which several other organs, but particularly the liver and spleen, are almost simultaneously and similarly attacked. These glands become infiltrated with, or transformed into, a translucent waxy material. The infiltration or degeneration begins in the kidneys in the capillary tufts of the Malpighian bodies, and in the coats of the small arteries; the tubes subsequently being affected, and getting filled with a transparent material. The effect on the kidney is at first to render it slightly firmer and paler than natural; then to increase it in bulk and weight, in pallor and density; and lastly to lessen the weight, and contract the gland. The latter also becomes more and more inefficient as an excreting organ, and ultimately useless. The disease causes the urine to be albuminous, while there may sometimes be found waxy or hyaline casts of the tubes, but little or no renal epithelium. And then the victims of it present all those marked symptoms which are usually set down as due to Bright's disease.

The lardaceous kidney is met with in connection with tubercular phthisis, advanced constitutional syphilis, and prolonged suppuration—often such as is due to scrofulous caries of the bones. I have also twice observed it in consequence of the suppuration of ovarian tumors. Both patients are still (1869) living. In one, the ovarian cyst opened spontaneously through the abdominal wall, discharged a large quantity of putrid pus, and for quite six months has continued to throw off small quantities of thin purulent matter. In the second case, the tumor was tapped by a distinguished surgeon, the cyst-wall seemed to inflame and suppurate, and for months a flow of pus has continued daily through the wound left by the trocar and

canula. In both cases, the urine has become highly albuminous; while it contains waxy casts. Prior to the morbid action in the ovarian tumors, the urine was healthy.

Professor Virchow states that a large proportion of the cases of Bright's disease, and especially of the chronic ones, are assignable to this change. The changes which the kidney undergoes cannot be distinguished immediately with the naked eye; so that not until iodine has been employed, can it be said what the disease really is. If a solution of iodine (the officinal liquor iodi answers well) be applied to the anæmic cortical substance, a number of brownish-red points appear, corresponding to the Malpighian bodies, with sometimes fine streaks also, which are the afferent arteries; and next to this, when the disease is very severe, red parallel lines are also seen within the medullary cones, lying very close to one another. These are all arteries.

Two excellent essays on this disease, illustrated by the reports of thirty-four cases, have been published by Dr. T. Grainger Stewart, of Edinburgh.* From these examples, the *symptoms* appear to run the following course: An individual who has had scrofula, prolonged suppuration from disease of the bones, or syphilis, or, perhaps, who is merely of a weak constitution naturally, finds that he is losing strength, that he suffers from thirst, and that he passes large quantities of urine. He has to rise in the night to micturate; and altogether three or four times the natural amount (fl. oz. 50) of urine may be excreted in the twenty-four hours. At the end of the day, the feet and ankles are observed to be more or less swollen; but a night's rest removes the œdema. As the lassitude increases, a swelling and hardness about the hepatic and splenic regions can be detected, owing to enlargement of the liver and spleen. On examining the urine it is found albuminous, of a low specific gravity, pale in color, and of an acid reaction; while on placing a portion of the scanty sediment which it contains under a quarter of an inch object-glass, a few delicate, transparent, waxy or hyaline tube-casts are seen. These casts are formed by the coagulation of an exudation from the bloodvessels into tubules denuded of epithelium: if the affected tubules contain a few cells, epithelial elements will be observed inclosed within the casts. This state of affairs may continue for months, or under favorable circumstances for a few years. But sooner or later, very distinct evidence of anæmia is observable; the amount of albumen increases considerably, while the quantity of urine diminishes; attacks of diarrhœa increase the debility, where the intestinal mucous membrane becomes affected with waxy degeneration; and ascites or general dropsy sets in. Ultimately the patient sinks, either from persistent diarrhœa, from effusion into the serous cavities, from bronchitis or pneumonia or pulmonary consumption, from exhaustion, or from convulsions and coma due to uræmic poisoning.

Concerning the nature of the new material which is deposited or formed in the walls of the small arteries and in the surrounding tissues, we have no very precise information. According to Dr. Dickinson it consists of fibrin, which has been thus deposited in consequence of the loss of the free alkali which is naturally associated with it. The dealkalized fibrin has its origin in protracted suppuration; the discharges removing the alkalies from the system, and at the same time causing a relative increase in the amount of fibrin.† Dr. Grainger Stewart believes that as to the real nature of the disease we must confess ignorance, and he doubts the cor-

* "On the Waxy, or Amyloid Form of Bright's Disease." Edinburgh Medical Journal, February, 1861, and August, 1864.

† On the Pathology and Treatment of Albuminuria, p. 174. London, 1868.

rectness of some of Dr. Dickinson's views. The points which seem to Dr. Stewart well established are (1) That it is a true degeneration or transformation of tissue, and not an infiltration. (2) That it consists of an albuminous material, probably deficient in alkali. And (3) that it results from long-continued exhausting diseases; such as syphilis, tuberculosis, caries, and chronic suppuration.* In partial confirmation of the foregoing, it may be added that several chemists, particularly Kekulé and Kühne, have expressed an opinion that the material is closely allied to albumen; and that since it has no relation to cellulose or starch, it cannot with propriety be termed amyloid.

As regards the *treatment* much good may be effected in the early stages by a nourishing diet, by residence at the seaside, and by the persevering employment of ferruginous tonics. Where there is any evidence of the previous existence of syphilis, iodide of potassium and some bitter infusion (F. 31), or iodide of iron (F. 32, 390), will often prove of great service. Occasionally, in these syphilitic cases, I have seen benefit result from the employment of the mercurial vapor-bath (F. 131); but the effect of this remedy ought to be watched. Certainly, in no other form of albuminuria is mercury in any shape to be prescribed.

IV. DIABETES.

Diabetes (also known as *diabetes mellitus*, *melituria*, or *glucosuria*) is a complicated form of disease characterized by the secretion of a large quantity of urine containing sugar. The amount of sugar varies from a few ounces to one or possibly as much as two pounds in the twenty-four hours.

Diabetic or animal sugar has the same chemical composition as that found in most kinds of fruit,—grape sugar or glucose. It differs from cane or vegetable sugar in being less sweet, and less soluble in water; in being rather more soluble in dilute alcohol; and in being dissolved by strong sulphuric acid, instead of charred and blackened as the cane variety is.

Pathology.—For remarks upon this head, as well as for the derivations of the various synonyms for saccharine diabetes, the reader is referred to the section on Glucohæmia (p. 35). It may be again mentioned, however, that this disorder is only here considered for the sake of convenience; since, with our present knowledge, we cannot say that diabetes is a disease of the kidneys, or of the liver, or of the lungs, or of the nervous system, or of the stomach. In examples of it, sugar may be detected in the blood, sweat, tears, saliva, and fæces, as well as in the urine.

Causes.—There is not much information to communicate under this head. A temporary diabetes can occasionally be produced by the excessive consumption of sugar or starch; possibly by mental excitement, or by prolonged intellectual work; and perhaps by long exposure to cold and damp. Diseases of the brain, certain forms of dyspepsia, and an irritable condition of the mucous membrane of the intestines, seem to have caused diabetes. The occurrence of this disease is also apt to be favored by hereditary predisposition.

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* A Practical Treatise on Bright's Diseases of the Kidneys, p. 184. Edinburgh and London, 1868.

Symptoms.—The first indications of this disease are not generally well marked; complaint being merely made of malaise, a parched mouth and thirst, and a general sense of feverishness. But it is early noticed that large quantities of urine are passed, having a faint odor somewhat like that of apples; the patient having to rise to micturate several times in the night. Owing to the quantity of water thus got rid of by the kidneys, it can be readily imagined that the most prominent effects will soon be great dryness and harshness of the skin; together with hardness of the fæces and constipation, and urgent constant thirst, which it is difficult to allay. After a time the general health begins to give way, and there is muscular weakness with a loss of all sexual power. Then follow such symptoms as pain in the loins; coldness of the extremities, and yet a sense of burning in the hands and feet; increasing debility, with a manifest shrinking of the frame and rapid diminution in weight; a chloroform-like smell of the breath; frequent headaches or fits of vertigo; and a feeling of weariness, with indisposition for mental and bodily labor. Moreover, a foul dry mouth, with gums red and tender and swollen, and a loosening or decay of the teeth, cannot but attract attention. There are very low spirits at times, and irritability; together with a constant feeling of sinking at the stomach inducing a voracious appetite. This disorder commonly progresses slowly and insidiously; while it often ends in, or becomes associated with, pulmonary consumption. It almost always proves fatal, but frequently is only the indirect cause of death. Thus, in addition to the liability to tubercular disease, a diabetic individual is very apt to suffer from boils or carbuncles, or from bronchitis, or from chronic pneumonia, or from gangrene of an extremity. Occasionally coma sets in suddenly and destroys life.

There would appear to be grounds for believing in the presence of some connection between diabetes and cataract. At all events, when the former has existed some time the latter may occur, the cataractous condition being symmetrically developed in both eyes. The cataracts are of the soft kind, and no cases have been seen where there was reason to suspect further disease of the eyeball. The accommodating power of the eye is likewise sometimes lessened by debility or paralysis of the ciliary muscle.

Diagnosis.—Diabetic urine has a sweetish taste and odor, is generally of a pale straw color, does not undergo putrefaction even when kept for several weeks, and is secreted in very large quantities. In health, the average amount of urine passed by an adult in the twenty-four hours may be said to be two and a half or three pints, while in the disorder under consideration this quantity may be increased to fifteen, twenty, or even thirty pints. On evaporating a few drops of diabetic urine, on a glass slide, beautiful crystals of grape-sugar may often be obtained, Sir G. Duncan Gibb having also succeeded in procuring them from the tears. The specific gravity of the urine is also very high, varying from 1030 to 1050; the more aggravated the disease, the greater being the density. This high density is not always due entirely to the sugar, for it may partly be owing to an excess of urea. So, contrariwise, the sp. gr. may be low (1015 or 1010) owing to the coexistence of albuminuria. This happened to be the case in a patient I saw with Dr. Kibbler (March 8th, 1868), which was a marked instance of diabetes, with chronic Bright's disease and cataract of the left eye. The urine was loaded with albumen, it contained 33 grs. of sugar in each fluid ounce, and yet its sp. gr. was only 1015.

Several tests have been proposed for the detection of sugar in urine. Thus we have:

The Fungus Test.—Prior to the publication of Dr. Hassall's admirable

paper,* much obscurity existed with regard to the development of vegetable fungi or torulæ in the urine. From this gentleman's researches it seems certain that urine, when it has been allowed to stand for a few days, may under certain conditions present two varieties of fungi. The *Penicilium glaucum* (that common fungus which imparts a mildewed appearance to decaying organic matter) is very commonly generated in acid urine, which contains albumen or mucus or epithelium. The greater the amount of animal matter, the more abundantly is this fungus developed. It ordinarily passes through three stages of formation, existing first as sporules, these passing into thallus, while from this proceeds the perfect or aerial fructification. But in acid saccharine urine, freely exposed to the air at a moderate temperature, there is developed a *sugar fungus*, and this is met with in no other condition of that secretion. It is identical with the yeast plant—the *Torula cerevisiæ*. The sugar fungus passes through three stages of development; though if the amount of sugar in the urine be small, growth may not proceed beyond the condition of sporules, the thallus and aerial fructification not being attained. The sporules and thallus are larger than those of the Penicilium glaucum, while the perfect fructification in the two species is wholly distinct. The presence of this sugar fungus indicates the vinous fermentation, its development being accompanied by the disengagement of carbonic acid and the formation of alcohol. The penicilium glaucum and the yeast fungus not unfrequently exist together in diabetic urine; but the latter, it must be repeated, is alone peculiar to it, and may be found when the quantity of sugar is too small for detection by the potash and copper tests.

The Potash Test.—Add to the suspected urine, in a test-tube, about half its volume of liquor potassæ, and boil the mixture gently for a few minutes. The liquid will assume a dark-brown tint if sugar be present, owing to its conversion into melassic acid. If, on the contrary, the urine be healthy, it will only be very slightly darkened.

Care must be taken (as Dr. Owen Rees first pointed out) that the liquor potassæ does not contain lead, as it often will if it has been kept in a white glass bottle. When it does so, on boiling it with urine the sulphur in this secretion produces a dark color with the lead, which might lead to an incorrect diagnosis. The test-solution should therefore be kept in a green glass bottle, which is free from lead.

The Copper Test.—There are different forms of the copper test in use for the detection of grape-sugar in the urine; but the principle of action is the same in all. The test must contain free oxide of copper, which, in contact with a boiling solution of grape-sugar is reduced to a suboxide. This falls as a yellowish or orange-red precipitate. Dr. Roberts, physician to the Manchester Royal Infirmary, has recommended the following: A test-fluid having been prepared with eight grains of sulphate of copper, thirty grains of tartrate of potash, and an ounce of liquor potassæ, it is to be used in this manner. Partly fill a test-tube—say to the depth of an inch—with the solution; apply heat until it begins to boil, and then add two or three drops of the suspected urine. If it be ordinary diabetic urine, the mixture, after an interval of a few seconds, will turn *suddenly* of an intense opaque-yellow color, and in a short time an abundant yellow or red sediment falls to the bottom. If, however, the quantity of sugar present be small, the suspected urine is added more freely, *but not beyond a volume equal to that of the test employed.* In this latter case it is necessary to raise the mixture once more to the boiling-point. It is then to be allowed to cool slowly. If no sub-

* Medico-Chirurgical Transactions, vol. xxxvi, p. 28. London, 1853.

oxide has been thrown down when it has become cold, then the urine may with certainty be pronounced sugar free.

Another plan is this: a little of the suspected urine is to be placed in a test-tube, and a drop or two of a solution of sulphate of copper added, so as to give the mixture a slight blue tint. A solution of potash is now added, in quantity equal to about half the volume of urine employed: this will throw down a pale blue precipitate of hydrated oxide of copper, which, if there be any sugar, will immediately redissolve, forming a purplish-blue solution. The mixture is then to be gradually heated to the boiling-point, when, if sugar be present, a yellowish-brown precipitate of suboxide of copper will be deposited. If there is no sugar, a black precipitate of the common oxide of copper will be thrown down. This test is sufficiently delicate for all ordinary cases, but it cannot be trusted to when the quantity of sugar is small. It is commonly known as Trommer's test.

Every now and again it happens that albumen is found in diabetic urine. When present it prevents the formation of the precipitate of suboxide of copper. Under these circumstances, the urine should be boiled and then filtered. Or it may suffice to simply filter it through animal charcoal, which substance separates albumen, uric acid, and fatty matters without interfering with the passage of the sugar.

The Fermentation Test.—Add a few drops of fresh yeast, or a little of the dried German yeast, to the suspected urine, and completely fill a test-tube with the mixture. Put some of the urine also into a saucer, and then invert the tube and stand it upright in this vessel, taking care that the tube remains full and free from bubbles of air; set aside in a warm place, having a temperature of about 80° Fahr., for some eight or twelve hours. If sugar be present, it begins very shortly to undergo the vinous fermentation, by which it becomes converted into carbonic acid and alcohol. This change will be recognized by the bubbles of carbonic acid causing gentle effervescence, and afterwards collecting in the upper part of the tube. The alcohol remains in the liquid, and can be separated from it by distillation if desired. When the urine is free from sugar no gas will be formed. To make certain that the yeast itself does not contain sugar, it may be tested with distilled water at the same time that the urine is being experimented with. Conversely, to be sure that the activity of the yeast is not impaired, it can be tried with an improvised saccharine solution.

To estimate the *quantity of sugar* contained in diabetic urine, Dr. Roberts* has suggested that it is only necessary to ascertain the specific gravity of the urine both before and after fermentation, and then from the loss of density occasioned by the conversion of the sugar into carbonic acid and alcohol, to calculate the amount of sugar destroyed. Thus the sp. gr. and temperature of a specimen of urine are to be noted. About four ounces of the same specimen should then be placed in a twelve-ounce bottle, and a lump of German yeast (the size of a small walnut) added. The mouth of the bottle must be covered with a piece of glass or card to prevent evaporation. Fermentation soon begins, if the glass be kept in a warm place, while by the end of twenty-four hours the process is not only completed, but the froth and scum are dissipated from the surface, so that the density and temperature may be taken. The fermented urine will be found to have lost a density varying from thirty to forty degrees, according to the amount of sugar destroyed. This diminution of density holds such pro-

* A Practical Treatise on Urinary and Renal Diseases, p. 142. London, 1865.

portion to the sugar originally present in the urine, that for every degree of density lost we may count one grain per ounce of sugar in the urine. Thus,

Density of diabetic urine before fermentation, . . .	1040 degs.
Density after fermentation, ...	1002 "
Density lost by fermentation, ...	38

These 38 degrees indicate that the urine contained exactly 38 grains of sugar per fluid ounce, or 740 grains in the imperial pint. It is necessary to remember that the temperature of the two specimens should be about the same, as a variation of 10° Fahr. affects the sp. gr. about one degree.

Prognosis.—In no disease can it be said with so much truth as in diabetes, that the patient holds his fate in his own hands. If he will exercise self-control, and be satisfied to eat that he may live, instead of endeavoring to gratify his palate, his life may be prolonged for some years; provided there be no organic disease, and that complications do not arise.

The chief circumstances which enable us to give a favorable opinion are: a healthy condition of the lungs; the absence of albuminuria; a marked diminution in the quantity of the urine, as well as of its density, on the sufferer being confined to an animal diet; an increase of body-weight and of muscular power; a lessening of the sense of thirst and hunger; a healthy condition of the teeth, and the occasional appearance of moisture on the skin.

Those cases are very unfavorable where the patient suffers from repeated attacks of bronchitis, where tubercles have become developed in the lungs, where there is albumen persistently in the urine, where the quantity of urine continues large and the sp. gr. high, where there is gradually increasing loss of flesh and strength, and where there is any hereditary tendency to the disease. It should be remembered that occasionally inosite or muscle-sugar seems to replace the grape-sugar, so that, while the tests for the latter indicate improvement, the general symptoms continue to progress. Inosite can be detected by evaporating the solution containing it with a little nitric acid, to dryness on platinum-foil. The residue is to be moistened with a little ammonia and a solution of chloride of calcium, and again evaporated to dryness, when a lively rose-red color appears. The true sugars do not give this reaction (Neubauer). Inosite has also been found in the urine of Bright's disease.

Treatment.—Our knowledge of the actual nature of this disease being faulty, a complete cure can scarcely be expected from the treatment; though it is surprising how much improvement diabetics often manifest, for a long time, from a well-conducted course of remedies. The first, and by far the most important, point is to regulate the diet; which should be nutritious, and as free as possible from every saccharine or amylaceous material. Of all kinds, animal food is the best; and the patient may take his choice of different sorts of meats, poultry, game, white fish, thin soups, and eggs. There would seem to be no objection to milk in moderation, as it is probable that the sugar of milk contained in it does not undergo the glucose transformation. Cream, cream or Neufchâtel or Stilton cheese, and butter, are in no way injurious. Greens, cauliflower, broccoli, spinach, chiccory, sorrel, lettuce, asparagus, artichokes, leeks, watercresses, and celery, may also be allowed in small quantities, if desired; but fruit, rice, sago, tapioca, arrowroot, oatmeal, maccaroni, confectionery, chestnuts, parsnips, carrots, peas, beans, and potatoes—which contain upwards of 30 per cent. of starch

and amylaceous fibre—must be forbidden. Patients would be much better without bread; when used care should be taken that it is well fermented and stale, and it will be as well to have it toasted. The bran loaf (F. 9) recommended by the late Dr. Camplin, has often very salutary effects, when taken continuously; and to abstinence from starch as it exists in ordinary bread, and the employment of this substitute, Dr. C. no doubt owed the prolongation of his own life for several years after he became diabetic. Gluten bread has been largely used, but I have found very few persons able to take it for any length of time. It is certainly superior to common bread; though inferior to the bran loaf, or to Dr. Pavy's almond rusks and biscuits. These are made with blanched almond powder and eggs; the former having been freed from sugar by washing with boiling water slightly acidulated with tartaric acid.*

The thirst will sometimes be best appeased by pure spring-water, or iced water, or soda-water, all of which are likewise very grateful to the stomach; or by Bordeaux or Rhine wines and Vichy or Seltzer water, when wine is not contraindicated. Weak beef tea, or mutton broth, will occasionally allay thirst better than other kinds of drink. Beer, cider perry, sweet wines, liqueurs, and raw spirits should be avoided. Tea and cocoa can be used; and often there is no objection to coffee. Weak brandy and water, or claret, may sometimes be allowed; while for variety, when stimulants are needed by the system, we may substitute the Hungarian Ruster, or dry Tokay, or Burgundy, or Moselle. If the patient wish to pay a visit to one of the foreign mineral springs he can be recommended to go to Vichy (F. 479), or Carlsbad (F. 496); the waters of either of which fashionable baths, but especially of the first, may prove useful for a time. And then, to conclude these general directions, the clothing must be warm, the whole body being covered with flannel or chamois leather; for cold and damp are especially to be avoided. The amount of exercise is to be regulated, usually the error being made of taking too little. An hour's amusement daily in a well-ordered gymnasium can, in many instances, be adopted with profit.

Amongst the medicinal remedies opium is the most important; since under its use the patient is not only greatly soothed, but his general symptoms are mitigated, and the specific gravity of the urine is lowered. It may be advantageously given in full and gradually increasing doses, until perhaps as much as eight or ten or twelve grains of the extract are consumed in the twenty-four hours. The vapor bath will frequently excite the skin to action, when other means fail, and thus be productive of much comfort; and so also with the warm water bath. The Turkish bath, once or twice a week, is a convenient remedy. The citrate of ammonia or potash with steel (F. 403) often proves very valuable; it should be taken for two or three weeks at a time, then discontinued, and recommenced according to the general strength. Carbonate of soda in small doses, taken for a long time, or the bicarbonate of potash in the same way, can at times be recommended. The ozonic ether (a compound of absolute ether and peroxide of hydrogen) has been said to prove curative in some instances. I have seen its employment followed in two cases by a kind of chronic intoxication and sickness; the remedy quickly causing such a sense of disgust that it could not be persevered with. In no way was the disease favorably influenced by this preparation, so far as could be learnt by these short trials. In

* Bran bread and biscuits, gluten bread, and almond rocks and biscuits, may be obtained from Van Abbot, 5 Princes Street, Cavendish Square; Blatchley, 362 Oxford Street; Bonthron, 106 Regent Street; and Hill & Son, 60 Bishopsgate Street.

some cases quinine proves useful, especially when combined with opium—one grain of each three or four times a day. Under the influence of strychnia, improvement has been manifested in several instances; the general health has improved, while the quantity of urine and its specific gravity have lessened. Cod-liver oil, and suet boiled in milk, not only do good generally, but patients have often remarked that they have felt more comfortable after these alimentary substances than after many other kinds. I have seen cases of diabetes where the craving for fat has been a prominent symptom, the demands of the patient to be supplied with this material being urgent and repeated. I need hardly add that these demands should be complied with so long as the powers of digestion are sufficient for the assimilation of such food. Glycerin for sweetening tea, custards, light puddings, &c., has been recommended as a substitute for sugar; but while patients do not generally allow that it is palatable, it has the disadvantage of often causing diarrhœa, of increasing thirst, and of not diminishing the total amount of sugar excreted in the twenty-four hours.

A few years ago, M. Piorry treated several cases of glucosuria by the administration of large quantities of sugar; meanwhile insuring abstinence to a great extent from all fluids. The remedy was given in the form of half a pound of treacle or honey daily; or sometimes from seven to ten ounces of the best white sugar were taken in the same time. Independently of the fact that very few English patients could be found willing to submit their stomachs to such an ordeal for more than two or three days, it is certain that the consumption of so much saccharine matter must prove considerably worse than useless. More recently, Dr. Owen Rees has published his conviction that the restriction of the diet of diabetics is injurious; saccharine and farinaceous food being as necessary to the comfort and well-being of such individuals, as to the systems of the healthy. Indeed, he goes so far as to say, "that abstinence from starchy and saccharine matter is injurious to the diabetic; and that the circulation of sugar in the blood is not productive of bad symptoms, either immediately or remotely."* Seeing that these views are diametrically opposed to those generally entertained, it might have been expected that Dr. Rees would have brought forward some strong evidence in favor of his opinion that dietetic treatment in this complaint is mischievous. At present, however, he has not done so. Until this is furnished, I see no reason for modifying the recommendations already made relative to the diet of diabetics.

V. DIURESIS.

The term Diuresis [διά = through + οὐρέω = to pass urine] is applied to that condition in which an excessive quantity of pale limpid urine is daily excreted. It is often spoken of as Diabetes Insipidus; the only objection to which is that it might lead to its being confused with saccharine diabetes, while there is not the least connection between the two affections. For although it was at one time believed that the urine in cases of chronic diuresis contained a tasteless kind of sugar, yet this view has now been completely disproved; and it is allowed on all hands that no saccharine matter of any kind is ever present.

* The Lancet, p. 4. London, July 7th, 1866. For a reply to Dr. Owen Rees by his colleague, Dr. Pavy, see the same journal, p. 106, July 28th, 1866.

The two chief *symptoms* in this affection are, insatiable thirst (polydipsia), and the elimination of an excessive quantity of urine. Generally speaking, the watery constituent of the latter is alone increased, the total amount of urinary solids not being greater than in health. This was the case in a delicate young lady, suffering from uterine disease, seen by me in consultation with Dr. George May, of Reading; in which instance eight quarts of pale urine were passed in the course of the twenty-four hours, sometimes for many days in succession. At the same time, a very few examples are recorded, where the urea and chloride of sodium have both been found considerably above the normal standard.

The amount of urine which comes away is sometimes so great that it has been believed to be in excess of the fluid consumed. Patients, especially young females, will produce tables very clearly kept, showing that when the whole quantity of fluids drunk in the day has been two pints, the urinary secretion has amounted to as many quarts or even to much more. From a glance at a little note-book now before me I find Miss A. B. recording that on January 14th the whole quantity of nourishment taken consisted of one pint and a half of fluids, half a pint of jelly, five small oranges, seven slices of toast or bread and butter, and one bun: while the urine discharged was seven quarts. On the following day, the consumption of fluids and solids was slightly lessened, and the urine fell to six quarts. And in this way the report goes on for many weeks, six and seven quarts of urine resulting from a pint and a half of cocoa or coffee. Discussion with patients thus infatuated answers no good purpose. It is much better quietly to suggest that the tables are by no means extraordinary; at the same time insisting that further observations of the kind are quite unnecessary, and must not be made. Nevertheless, it is really a question whether there may not be some excess of the urine over the liquid taken, under certain circumstances. If there be, one of three explanations—as Dr. Parkes points out—must be adopted: (1.) Either the body becomes poorer in water, and so loses weight. (2.) Or, water is absorbed by the skin and lungs. (3.) Or, water is formed in the system by the direct union of its elements—oxygen and hydrogen. No reference is here made to the absorption of dropsical effusions, because the removal of these fluids in this manner has no bearing on the argument in question.

In the *treatment* of those cases where there is only an excess of the urinary water we cannot do better than employ one of the astringent preparations of steel. The tincture of the perchloride of iron with hydrochloric acid (F. 101), or the ammonia iron-alum (F. 116), will generally answer every purpose. Sometimes a dose of opium at night may do good; or if the action of the skin be suppressed a few warm baths can be ordered. Supposing that the urinary solids are increased, indicating undue waste of tissue, the cause must be sought before the effect can be removed. Especially ought the symptoms of nervous exhaustion to be looked for; while if such are present, cod-liver oil, phosphoric acid, and nux vomica (F. 376), and a diet of animal food with a little good beer, will probably prove useful. In all cases the amount of fluids consumed must be regulated.

A remarkable form of *infantile diuresis*, which has been well described by Dr. Prout* as not uncommonly happening soon after weaning, ought to claim attention. The symptoms are as follows: From having been healthy until the change of food, the child begins to get dull and inactive, and to

* On the Nature and Treatment of Stomach and Renal Diseases. Fifth edition, p. 58. London, 1848.

daily lose flesh. The skin feels harsh, dry, and hot. The bowels become irregular; the motions assuming an unnatural greenish appearance. The abdomen grows prominent, so as to lead to the suspicion of mesenteric disease. At this period, the urine is generally scanty and high-colored; becoming turbid immediately on cooling, and letting fall a pale and clay-colored deposit of urates, sometimes intermixed with the oxalate of lime. Now and then there is an excess of phosphates. As the disease proceeds, the quantity of urine rapidly increases; and the thirst being commensurate, large quantities of fluid are consequently taken. Under these circumstances an infant about twelve months old will be often found to pass from two to four or five pints of urine in the twenty-four hours. The urine in this, and indeed in all the subsequent stages of the affection, is commonly transparent, and of a pale yellow or greenish tint. Its specific gravity varies from 1010 to 1025; while on examination it will be found to contain a great excess of urea, and occasionally even traces of albumen or sugar.

This form of diuresis must be considered as rather formidable; since, if it be neglected or maltreated, it most commonly ends in organic lesions of the kidneys, or in diabetes. It most frequently occurs in the children of strumous individuals, who are at the same time dyspeptic or gouty; especially if such children have been improperly nourished, or have been brought up in confined and imperfectly-ventilated apartments.

The general principles of treatment are,—removal to a pure country atmosphere, or to the seaside, where a bracing dry air can be breathed; the employment of tepid, or warm, sea-water baths; as well as attention to the diet—animal food (minced very fine or pounded in a mortar) and farinaceous matters being most suitable, with plenty of milk. As soon as possible, there should be a gradual but steady diminution in the quantity of fluids allowed. Now and then, the administration of small doses of Dover's powder to increase the functions of the skin, as well as to relieve the general irritability, seems advisable. Gentle aperients will be needed to regulate the state of the bowels; pepsin should be tried, if any indications of dyspepsia present themselves; cod-liver oil serves to remove all evidence of imperfect nutrition; and lastly, tonics of bark, quinine or steel, will prove highly useful.

VI. CHYLOUS URINE.

Urine of a milky appearance from the presence of fatty matter, in a molecular state, is known as chylous urine—chyluria. In addition to the fatty matter, there is generally present one or more of the following ingredients,—blood-corpuscles, fibrin, albumen, and an imperfect albumen like that of chyle (albuminose?). The urine after standing for a short time, and unfortunately sometimes whilst it is in the bladder, coagulates into a trembling mass resembling blancmange or common size.

The importance to be attached to the fact of the urine being chylous varies in different cases. The most favorable instances are those where at some time in the twenty-four hours the secretion is healthy, containing neither chyle nor albumen. In one of the examples of this disease, presently to be mentioned, which has fallen under my notice, the urine passed in the morning before taking food has more often than otherwise been healthy; the chylous condition setting in with the digestion of the breakfast. But in the instance of a lady under the care of Mr. Cubitt of Stroud

(Beale's *Archives of Medicine*, vol. i, p. 11, London, 1857), the urine passed in the morning, after a night's rest, was milky; while at no time was it ever so during the day. Mr. Dutt has also recorded (*Lancet*, July 26th, 1862) a similar instance; the patient, a male Hindoo, passing urine free from chyle during the day, while that voided during the night and in the morning was deeply loaded with it. A microscopic examination of chylous urine shows that the fatty matter is present in a molecular state; but if, in addition, cells of renal epithelium loaded with oil-globules are found, such will indicate the coexistence of chronic Bright's disease.

On examining the kidneys after death in cases where the urine has been chylous, no alteration perceptible to the naked eye has yet been discovered. Nevertheless, the disease may possibly depend upon some structural change in these glands; owing to which certain constituents of the blood filter through the vessels into the urine. Dr. Carter of Bombay has detailed (*Medico-Chirurgical Transactions*, vol. xlv, p. 189, London, 1862) the particulars of three instances which have led him to believe that this affection is the consequence of a direct admixture of chyle and urine—a leak from the lacteal track into the urinary. With regard to these three cases it seems highly probable that the explanation is correct; but further observations, particularly post-mortem investigations, must be made before we can accept this view as generally applicable. Dr. G. R. Bouyun of Demerara has described (Golding Bird's *Urinary Deposits*, 5th edit., p. 422, London, 1857) some cases of this disease in which the chylous state of the urine was always accompanied by attacks of irritation, fever, emaciation; while he seems to prove that the affection is often epidemic at Demerara, especially amongst creoles and negroes. Dr. Bouyun refers it to some derangement of the assimilative functions; and he has been successful in curing it by the free administration of a decoction of the mangrove bark (Rhizophora racemosa), which acts freely on the skin, alters the character and increases the quantity of the urine, and improves the general health.

Examples of chylous urine are rarely met with in Europe, more than half of the instances recorded having occurred in individuals resident in hot climates, or in the natives of the East and West Indies, Mauritius, Brazil, &c.* The appearances presented by the urine are these: It is usually

* I have only had two cases under my own charge, the histories of which may be related here, as they serve to show the progress and symptoms and duration of this disease. The history of the *first* example is as follows: Mr. J. G., æt. 44. Married. Is a saddler. Applied to me on May 7th, 1862, at the wish of his medical adviser, Mr. James Wilson. Says that he was born in the West Indies, and lived at Trinidad until he was seven years old. Was then brought up in Scotland. For the last twenty-two years has resided in London; with the exception of ten months, ten years ago, which he spent in Trinidad. In 1848 he began to notice that his urine was thick and milky, that he was losing strength, and that he had pains in his loins. He consulted Dr. Prout. He at first improved under the influence of steel; but his water continued white, and at times deposited a pink sediment. In October, 1849, he placed himself under the care of Dr. Bence Jones. This gentleman's excellent reports of the case in volumes xxxiii and xxxvi of the Medico-Chirurgical Transactions, as well as in the Transactions of the Royal Society for 1850, are well known to the profession. Dr. Bence Jones twice analyzed the urine, with the following results:

	October 19th, 1849.	October 30th, 1849.
Water,	955.58	943.13
Solid matter,	44.42	56.87
Albumen,	14.03	13.95
Fat,	8.37	7.46
Urea,	13.26	24 06
Saline ash,	8.01	10.80
Loss,	.75	.60

opaque and of a cream color, owing to the presence of molecular fat, which can be dissolved by ether; on cooling it forms into a trembling co-

On the day of the last analysis, before reserving the urine for examination, Mr. G. was bled. The serum of the blood was opalescent, but not at all milky. The blood contained in 1000 parts 240.03 of solid residue, viz.: fibrin, 2.68; blood-globules, 159 3; and solids of serum, 78.1. The fat amounted to 0.62.

The urine continued chylous until February 14th, 1850, when it became healthy and continued so until October 5th. On this day there was a relapse; but as the use of gallic acid was recommended, the restoration to health seemed complete in about forty-eight hours. On December 26th there was a second relapse; gallic acid was given, and on some days the urine was healthy, on others chylous, until February 7th, 1851, when it became natural. On September 10th there was a third relapse, but he got better in a few days. The fourth relapse occurred on September 28th, and in spite of gallic acid, acetate of lead, and nitrate of silver, it lasted until February 1st, 1852, when the urine was free from chyle or albumen. He continued well, sailed for the West Indies on September 30th, and returned in 10 months. There was no relapse, and Dr. Bence Jones found the urine healthy on July 20th, 1853. Up to the day of recovery from the fourth relapse he had taken, in the whole, very nearly forty ounces of gallic acid. Mr. G. tells me that on leaving for the West Indies his weight was a litte over 9 st., while at his return it was 12 st. 7 lbs.

From this time he seems to have remained well for some years. But hard work at an army clothier's gradually told upon him, and when he applied to me, in 1862, his general health had been bad and his urine very chylous for several months. The specimens which he brought with him were of different characters. In one bottle the secretion was natural in color, but had coagulated so that it looked like size; the other bottles were filled with fluid exactly resembling milk. The urine passed in the morning fasting was always the most natural. He was ordered gallic acid (gr. 30) thrice daily, an occasional Turkish bath, and opium at night. Without making much progress he continued under treatment for some time; occasionally having quinine and steel, but always soon returning to the gallic acid in forty-grain doses. Cod-liver oil was also taken. On many occasions the urine was white and solid, like blanc-mange; on others, of a natural color but firm, like calf's-foot jelly. Frequently it became partially solid in the bladder, and long strings of coagulum were passed by the urethra. The liquid milky urine could always be cleared by an excess of ether. It contained a quantity of albumen, but no sugar. The secretion passed fasting in the morning was natural and free from albumen. At times, and for many days in succession, he would be much better; and then the symptoms returned. But on December 31st, 1863, he seemed quite well, the urine having continued healthy for several weeks. On January 17th, 1865, my notes state: Mr. G. has remained well since the last report. Recently, the secretion voided after taking food has become chylous, but never solid. The early morning urine is healthy. His general condition is favorable.

The chief features of the *second* case are these: Dr. Edward G., ætat. 58. A widower. Applied to me on August 16th, 1862. Has resided in Calcutta for many years. Was in England for a short time nine years ago, and has been here now for eighteen months. He returns to India in a few days, as his leave expires shortly. Has usually been strong and well, with the exception of occasional attacks of hepatic congestion. About twelve years ago he first noticed that his urine was milky, but it only remained so for a short time. Six years back had a second attack, which lasted for eight or nine months; but as the cold season set in he almost "insensibly got well." Since then has had two or three slight relapses. Two months ago he noticed that the chylous condition of his urine was returning, and for the last three weeks the secretion has been persistently milky. Sometimes it becomes solid after being passed. Part of the specimen brought to me was as firm as blanc-mange; the fluid portion looking like milk, until it was cleared by the addition of ether. He thinks he has derived most benefit from the tincture of perchloride of iron, the compound jalap powder, and from drinking freely of cold water. I recommended ten-grain doses of gallic acid, thrice daily. On August 19th Dr. G. sailed for Calcutta, determined to give the gallic acid a fair trial; it was also suggested that he should have a sea-water sponge bath every morning, and should take a little ammonio-citrate of iron every day with his dinner and supper. May 8th, 1863. In a letter from Calcutta of this date, Dr. G. says: "I recovered from my complaint suddenly on November 1st, when the weather became cold and bracing, and I con-

agulum, though after several hours this substance breaks up and liquefies; the presence of albumen is shown by testing with nitric acid and heat; the specific gravity is low; and examined microscopically, minute fatty granules with numerous chyle-corpuscles are seen.

The invasion of this disorder may be gradual or sudden. The symptoms are usually intermittent; that is to say, an attack lasts for a few days or weeks, and then passes off, perhaps, for months. The way in which the character of the urine varies at different times in the twenty-four hours has already been noticed. In the intervals of health the urine is natural; there is no albumen present nor any abnormal ingredient. While the urine continues chylous the general state of the system is depressed. The patient complains not only of bodily weakness, but he is exceedingly anxious about himself. He loses flesh. There is considerable lassitude, taking away all desire for exertion of any kind. Moreover, there is often pain about the loins, tenderness in the epigastrium, a difficulty in digesting solid food, with a tendency to restless nights.

The remedies which can be opposed to this condition are few and for the most part ineffectual. So far as is at present known, astringents are the agents from which most is to be hoped; while of the different drugs of this class, gallic acid in large doses is the best. The tincture of perchloride of iron has now and then answered for a time. A decoction of mangrove bark (Rhizophora racemosa) seemed to cure one case. A tight belt, worn round the loins, gives relief to the backache. Residence in a bracing air ought also to be recommended.

VII. RENAL ENTOZOA.

The entozoa which may infest the kidney are of two kinds,—Hydatids and the Eustrongylus gigas.

With reference to *hydatid* formations it is not necessary to detain the reader long, since these entozoa, which are in reality the six-hooked embryos of the tænia echinoccoccus, have already been described, as they have their seat in the liver, an organ which they affect more frequently than all the other tissues combined. Hydatids in the kidneys are very rare. Only one gland is affected, and usually there is merely one parent cyst containing many secondary or daughter cysts. Sometimes a spontaneous cure seems to take place; but in other instances there is a continuous though slow development, until a tumor of considerable size gets formed. Under these circumstances, inflammation and ulceration are at length set up; and an opening takes place between the tough opalescent walls of the cyst and the loins, or the bowel, or the pleura, and perhaps a bronchus. Not uncommonly, the cyst bursts into the pelvis of the kidney; when probably small cysts and shreds of large ones, with echinococci and their hooklets, will pass down the ureter into the bladder, and thus be voided with the urine. During this transit they may cause pain and nausea, with sero-purulent or bloody urine, such as is produced by the passage of a renal calcu-

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tinued well for nearly three and a half months." Then the complaint returned, "and I have been ill ever since. The climate of India certainly does not agree with me, and I must try and get back to Old England." After this Dr. G again recovered, and on June 24th, 1864, Mr. G. informed me that his father was quite well.

lus; while they are likewise apt to temporarily obstruct some portion of the urinary passages, and so to give rise to difficult micturition or even to complete retention of urine. It is probable that perfect recovery in these cases is not so rare an event as might be prognosticated.

As that which has happened once may occur again, it is as well to notice that parturition has been rendered difficult by an extraordinary enlargement of the fœtal kidneys from the development of hydatids in their substance. In a paradoxical case reported by Dr. Oesterlen,* of Murrhardt in Würtemburg, a still-born female child, arrived at maturity, and brought into the world after much delay, was found to have an enormously large abdomen. On opening this, the viscera were almost entirely concealed by two enormous kidneys; the whole substance of these glands being occupied by small cysts in countless multitudes. The only remnants of true renal parenchyma consisted of firm fibrous and reddish tissue, which was but scanty in quantity; while each pelvis was small, and contained a little clear watery fluid.

At first sight, the foregoing case seems exactly to resemble that of simple cystic disease reported by Mr. Jardine Murray, and to which attention has already (p. 690) been drawn. But the inference that Dr. Oesterlen was wrong in the view he took of the nature of the sacs in his subject is scarcely justified by the history. Certainly he spared no pains in the investigation. He believed that he had before him true hydatids (Laennec's acephalocysts); and he thought they could not have been formed by any change in the renal tissue, as the surfaces of the sacs were at no points organically connected with the atrophied parenchyma. Hence the cysts could be easily shaken out without breaking.

The *Eustrongylus gigas* (known also as the Strongylus gigas, Ascaris renalis, Lumbricus in renibus, &c.) occurs so seldom in the human subject that I do not think a single kidney containing it has been shown at the Pathological Society of London in twenty-two years; while I am not sure that there is more than one specimen of it in the Hunterian Museum. Nevertheless this entozoon, the Antæus of the round worms, not unfrequently destroys the renal structure in the weasel, otter, raccoon, dog, ox, horse, &c.; while it has been found to be the origin of fatal mischief in man. The eustrongylus has a cylindrical elastic body, is of a blood-red color, and is slightly attenuated at both extremities; the male measuring about one foot in length and a quarter of an inch in breadth, while the female is three times as long and twice as broad. The symptoms produced by this worm very much resemble those caused by a renal calculus. Thus, there is pain in the loin, purulent and sometimes bloody urine, with considerable constitutional disturbance if the worm escapes into the ureter and blocks it up. If the impediment remain, hydronephrosis will result from the retention of urine in the pelvis of the kidney; thus giving rise ultimately to a tumor in the lumbar region. Where the ureter remains permeable, it has been suggested that a microscopical examination of the urine might lead to the detection of the oval-shaped ova; which are numerous, and measure the one three-hundredth of an inch in length. The patient, however, would not be likely to benefit very much by the discovery, if the second suggestion of an authority on these matters was followed,—the making of an incision into the kidney to remove the intruder.

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* Neue Zeitschrift für Geburtskunde. Vol. viii, p. 384. Berlin, 1840.

VIII. RENAL CALCULI.

Urinary calculi are found either in the kidneys, or in the bladder, or in the follicles of the prostate gland. In very rare cases one or more of the urinary salts become deposited in the ureters, or in the urethra; but usually the calculi found in these situations have travelled there from the kidneys or bladder. Urinary calculi are not peculiar to man; being also found in oxen, horses, sheep, pigs, and very frequently in rats. These concretions are formed of concentric layers of crystalline or earthy salts, with a variable proportion of organic matter. A few are composed of only one earthy constituent: others are of a composite nature, the composition of the different layers alternating. Thus urate of ammonia and oxalate of lime are frequently associated in the same stone.

The chief *varieties* of calculi are the Uric acid; the Urates of Soda and Ammonia and Lime; the Fusible calculus,—Phosphate of Lime, with Phosphate of Magnesia and Ammonia; the Mulberry calculus,—Oxalate of Lime; the Carbonate of Lime; and those very uncommon forms, the Cystic and Uric or Xanthic Oxides. Pseudo-calculi of fibrin or blood-coagula, or of urostealith (a resinous or fatty substance) are exceedingly rare.

Urinary concretions, whatever may be their composition, vary very much in size. Thus, they occasionally merely resemble grains of sand, being so small as to pass readily with the urine. Particles of gravel thus voided will be found made up of aggregated crystals of the urinary salts, so that they are really microscopic calculi. In other instances, however, they are discovered as large as a small orange. When a stone has formed in the pelvis of the kidney, it may, while of moderate size, enter the ureter and gradually be forced onwards towards the bladder. The suffering which takes place during the transit is very great, and is popularly known as "a fit of the gravel." But as soon as the calculus reaches the bladder, all pain is over for a time; and if it be true, as some philosopher has remarked, that the height of happiness is sudden relief from great suffering, the patient is indeed a happy man.

One or more calculi may, however, not only form in the kidney, but remain there; gradually growing and filling the entire pelvis. Possibly this will happen in both glands. But in any case, the presence of one or more stones in the kidney is a most unfortunate circumstance. The concretions produce, by their mechanical action, well-marked *symptoms;* the chief of which are almost constant backache, bloody urine, and reflex irritation of distant organs.* The pains, as well as the attacks of hemorrhage, are in-

* The following case may be regarded as a good example of the suffering which is induced by renal calculi, and of the time which can elapse from the commencement of the symptoms until a fatal result ensues. The principal points in the patient's history are as follows: On April 24th, 1862, I was consulted by Mr. R., ætat. 53, one of the head clerks at a large insurance office. Both his grandfathers died from stone in the bladder. His father was a great drinker of port wine: he never had gout, lived to be 80, and for several years very rarely went to bed sober. None of Mr. R.'s numerous brothers and sisters ever had stone. Mr. R. first complained of pain in the back, for which he was cupped, in 1838. He resided in York from 1839 until 1843: he had frequent attacks of backache, and occasionally passed bloody urine. In 1843 he came to London: had advice, and used baths and plasters. One day in 1846, after great suffering, which had continued all the previous night, he passed three small stones by the urethra. There was always bloody urine subsequently, with occasionally great pain, until 1852, when after some days of agony he got rid of five small calculi. They were analyzed, and found to consist of oxalate

creased by walking exercise, and by a jolting drive. Alcoholic drinks can rarely be taken with impunity. After a time, the general health suffers to a considerable extent. As the foreign body increases in size, so it encroaches on the true structure of the kidney; and either converts the gland into a large cyst, or, perhaps, sets up suppurative inflammation. Now and then ulceration has extended through the kidney and the loins, one or more stones having passed out of the opening thus made. More commonly, however, death occurs from uræmia; the secreting structure of the kidneys becoming entirely destroyed.

In the *treatment* of cases of renal calculi we have, first to relieve the general symptoms; secondly, to endeavor to prevent the formation of fresh stones, as well as to check the further increase in size of such as already exist; and thirdly, when a calculus enters the ureter we must facilitate its passage to the bladder.

The *first* indication is to be accomplished by supporting the health with a plain diet. Milk, cream, animal food, and raw eggs, are beneficial. I am convinced that alcoholic drinks usually prove injurious; but if something of this kind must be allowed, it will be best to prescribe certain specified quantities of brandy or whisky well diluted. All kinds of beer and wine had better be avoided. Cod-liver oil will often be useful. The pain in the back may be best relieved by the application of belladonna plasters, and by wearing thick flannel or chamois leather jackets next the skin. To check the hemorrhage we should order either the tincture of perchloride of iron (F. 101, 397), or the iron alum (F. 116); but at times, when the loss of blood is greater than usual, no remedy answers better than gallic acid (F. 103).

The plan to be pursued under the *second* head must vary with the supposed nature of the calculus, although in all cases more than the customary quantity of fluids should be consumed. Pure water is most serviceable, but it is difficult to make some patients think so, and hence it is often advantageous to prescribe large quantities of simple aerated water.

In the *uric acid* diathesis, a vegetable diet, avoidance of alcoholic drinks, the free use of simple diluents or of mucilaginous drinks, gentle exercise,

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of lime. In 1853, he again passed three stones, none coming away after this time. When I first saw him he told me that he was never free from severe pain in the loins. He appeared thin, weak, nervous, and irritable. His urine was very bloody, acid, sp. gr. 1010, and loaded with albumen: a microscopic examination detected pus and blood-corpuscles, with crystals of the triple phosphate. In spite of his suffering he was able to go from Chelsea to the City, and back again, every day. Experience led him to travel by the steamboat when possible: the jolting of an omnibus was often unbearable. All alcoholic drinks increased his misery. Most benefit was derived from the tincture of perchloride of iron. On October 20th, 1862, he caught typhoid fever while nursing a relative. Uræmic symptoms set in, and he died on November 10th. On the following day I examined the body, assisted by Mr. Smith, of King's Road, Chelsea. The abdominal viscera and the bladder were healthy, with the exception of the kidneys. The left kidney consisted merely of a large cyst: it contained one stone the size of a potato weighing 36 drs., another weighing 16 drs., and a third of the weight of 2 drs. The right kidney was enlarged, but there was a considerable portion of healthy structure. In the dilated pelvis were several calculi; the three largest weighing respectively 14, 9, and 3 drs. An analysis of these stones, kindly made for me by Mr. Hadow in the laboratory at King's College, showed that they consisted of Phosphate of Lime, with layers of fusible Phosphate (a mixture of Phosphate of Lime with Ammonio-Phosphate of Magnesia). There was neither lithic acid, urate of ammonia, nor oxalate of lime. Many of the stones presented a kind of mushroom shape, having been moulded in the calyces, infundibula, and pelvis of the kidney. In estimating the size of the calculi from their weight, it must be remembered that the phosphatic concretions are very light.

attention to the bowels, and the employment of alkaline aerated waters—as those of Vichy or Carlsbad—will be beneficial. Alkalies often give relief, and none can be employed so advantageously as the salts of potass, since soda often combines with the uric acid to form a hard and insoluble salt, while magnesia in large doses is very apt to cause intestinal concretions. The bicarbonate of potass may be freely given without any of these disadvantages; the liquor potassæ in large doses (min. xxx in water fl. oz. 3) is also an agent possessing valuable properties, which appear to have been generally overlooked. For the *phosphatic* diathesis a directly opposite course of treatment will be necessary. The diet ought to be generous, a moderate allowance of whisky or brandy may perhaps be allowed, and tonics (such as bark, iron, and the mineral acids, especially the nitro-muriatic) should be administered every now and then. Opium is also a valuable drug in these cases. Complete mental relaxation must be insisted on. As regards the *oxalic acid* diathesis, all articles of food containing this agent—such as the common garden rhubarb, must be avoided; saccharine substances also ought to be disallowed. The nitro-hydrochloric acid will generally prove useful (F. 378), and tepid or cold bathing, change of air, &c., should be recommended.

In the *third* place we may be called upon to relieve the great suffering caused by the passage of a calculus down the ureter. This will perhaps be most readily effected by the prolonged use of the warm bath, by the free use of emollient diluents—especially by barley-water containing a couple of fluid drachms of the spirit of nitrous ether, as well as by putting the patient under the influence of chloroform, or else by the administration of full doses of opium. The subsequent passage of the stone from the bladder will be facilitated by the patient allowing the urine to accumulate, and then getting him to discharge it with force while he is in a hot bath, or by introducing a large silver catheter with an open extremity, and washing out the bladder with warm water. When the calculus is too large to be thus got rid of, surgical interference—lithotrity or lithotomy—will subsequently be required, no satisfactory plan for producing solution within the bladder having yet been discovered. With regard to the selection of crushing or extraction, as well as for full information on the mode of operating, reference should be made to the writings of Sir William Fergusson, Mr. Coulson, and Sir Henry Thompson.

IX. CANCER OF THE KIDNEY.

Cancer is probably the rarest form of renal disease. Dr. Walshe has collected forty cases of cancer of the kidney from different sources. In thirty-one of these, pure encephaloid—or one of its varieties—was the species of cancer observed, while there were only five cases of scirrhus. The disease affected both organs sixteen times, the right alone thirteen times, the left alone six. Cancerous degeneration, like many other forms of renal disease, commences usually in the cortical substance, and thence extends to the medullary cones and to the walls of the pelvis and ureters.

In one instance of renal cancer about which I was consulted by Dr. Greenhalgh (in 1849 and 1851), the gland was enlarged to such an extent that it simulated in many respects a solid ovarian tumor, and had indeed been diagnosed as such. On the two occasions when I saw the patient she

was pregnant; and consequently, as only an incomplete examination could be made, no positive opinion was given, though I was certainly inclined to regard the tumor as ovarian. After death the right kidney was found to be the seat of disease, being enlarged at least to the extent of two adult heads. I am acquainted also with the particulars of a similar case where the tumor was diagnosed as ovarian, and where tapping was had recourse to (in 1864). But although only a little blood came away through the canula, the true nature of the affection was not suspected by the operator until an examination after death revealed it. And I have heard of a third instance in which the abdomen was opened (in 1865) for the removal of a supposed ovarian tumor. The patient died; and at the autopsy the disease was found to consist of an encephaloid (left) kidney. Allusion has already been made in this volume (p. 680) to the case of medullary cancer of the kidney, where this gland was extirpated on the supposition that it was a cystic tumor of the liver.

Dr. Owen Rees states that the following are the chief points to be noticed in the *diagnosis* of malignant disease of the kidney from calculus: 1. In malignant disease the blood is generally passed in larger quantity than in calculus of the kidney. 2. There is more frequent tendency to nausea *on slight occasion* than in calculous disease. 3. Microscopical examination of the urine will frequently show pus or mucus in excess, if there be calculus; whereas in malignant disease this sign does not so frequently exist. 4. The appearance of those suffering from malignant disease of the kidney is nearly always indicative of a state of anæmia more or less advanced. 5. In calculus, hæmaturia generally follows upon some unwonted exertion. 6. Careful examination of the abdomen will frequently lead to a detection of tumor, if there be malignant disease of the kidney.

It is not always an easy matter to distinguish *tubercular disease of the kidney* from cancer. But a consideration of the chief features presented by the former may be of some assistance, and I would therefore recommend the following points to be borne in mind: The gland may be much enlarged; owing either to the confluence of softened tubercular deposits, or to the gradual distension of the pelvis by retained urine and pus. There are night-sweats, rapid emaciation, and attacks of diarrhœa; with occasionally burning pain in the loin corresponding to the seat of disease. The urine contains pus and blood; sometimes there are small cheesy-looking masses, visible to the naked eye; while a minute examination may perhaps detect tubercular matter, granular débris, elastic fibres, and epithelial casts of the tubes. Moreover, renal tuberculosis is very rarely a primary disease, being generally secondary to pulmonary phthisis. Death usually occurs in from twelve to eighteen months after the commencement of the symptoms indicative of kidney affection; while the fatal result may be due to exhaustion, or more rarely to uræmia or pyæmia. In a few instances, the kidneys of new-born infants have been found in a state of disorganization from the degeneration of tubercle.

The connective tissue around one or other of the kidneys is now and then the seat of medullary cancer, giving rise to a tumor of perhaps very considerable size. The kidney itself may remain perfectly free from any malignant disease; though it will perhaps manifest indications of more or less advanced fatty or other degeneration, owing to its nutrition being impeded by the pressure of the surrounding disease. The amount of albumen in the urine, and the prominence of other symptoms of renal disease, will necessarily depend upon the duration of life after the pressure on the kidney or its bloodvessels has begun to be appreciable. Cancer in this situa-

tion has been found in young children more frequently than in adults. Renal cancer itself, however, has been a cause of death during infancy.

If the urine be microscopically examined either in malignant disease of the kidney or bladder, it will generally be found to contain cancer-cells; together with fibres of connective tissue, blood-corpuscles, &c. In renal calculus, the epithelium of the pelvis of the kidney is sometimes rapidly exfoliated; while as these cells are of a caudate and irregular form, they are very likely to be mistaken for cancer-cells. The spindle-shaped epithelial cells of the ureter also bear a close resemblance to the cells of scirrhus. The general symptoms will, however, aid the diagnosis; for in advanced renal cancer there is usually considerable pain in one or both loins, attacks of nausea and vomiting are very frequent, the malignant cachexia is present, the loss of flesh and strength increases daily, and the enlarged gland can be distinctly felt.

In the *treatment* we can only do good by supporting the patient's strength; while every endeavor is made to relieve the suffering with subcutaneous injections of morphia, opiate suppositories, &c.

X. SPERMATORRHŒA.

The consideration of the subject-matter of this section can hardly be approached without a feeling of misgiving, if not of actual repugnance. The disagreeable term "spermatorrhœa" [$\Sigma\pi\acute{\epsilon}\rho\mu\alpha$ = seed + $\acute{\rho}\acute{\epsilon}\omega$ = to flow] has been so grossly abused, and is so constantly employed by the vilest charlatans to intimidate their unfortunate dupes, that many practitioners would perhaps wish to ignore the topic altogether. Yet it seems to me that to do this is merely to rush from one extreme to the other. For it cannot be denied that a morbid condition may be induced, the chief feature of which is the involuntary escape of seminal fluid; while it is as certain that the consequences of such losses, if oft repeated, are decidedly injurious to the mental and bodily health. The victims of this disorder, however it may have been brought about, are as much entitled to our care and consideration, as those afflicted by other diseases. The physician who is familiar with the many varieties of human suffering and human weakness should be the last to acknowledge any bounds to his ministrations. It is happily no part of his duty to inquire whether the calamity be a just retribution. Suffice it that it is the obligation, perhaps rather the privilege, of his noble art to give all the relief in his power to a fellow-creature struck down by pain and sickness; whether the suppliant be the inmate of an hospital or a prison, of a palace or a hovel.

The most frequent *cause* of spermatorrhœa is self-abuse. Youths who have never received a kindly warning, and who have been allowed to grow up without being taught even the rudiments of physiology, or the necessity for moral control, contract pernicious habits before they are aware of the mischief they are inflicting upon themselves. Exciting conversations, with the perusal of "sensation" novels and newspaper reports of the proceedings in the Divorce Court, early arouse the passions and are productive of the most pernicious effects. To deny this is simply to shut one's eyes to a grave evil; an evil which is so patent to those who have the control of young men, that no very long time since (I believe it was in the year 1864) an earnest and very distinguished preacher delivered a sermon on this subject

at one of our universities. But to students at college the warning often comes too late; for this bad habit is not unfrequently early and easily acquired, though it can be broken only with the greatest difficulty.

It is a common mistake to suppose that the functions of the testicles must necessarily be performed after the time of puberty. These glands may be perfectly healthy and yet quiescent; just as is the case with the mammary glands until their powers are brought into play. But when the secretion of seminal fluid has been repeatedly encouraged, a hard struggle will alone stop the continued formation of this fluid. It may be doubted whether the serious symptoms which occur in spermatorrhœa are directly due to the loss of seminal fluid, or only to the effect of the cause of this loss upon the nervous system. Seeing what occurs in women, where no discharge follows upon masturbation, I am rather inclined to adopt the second view.

The seminal fluid is composed of a semi-transparent and glutinous and alkaline fluid, called liquor seminis; of granular corpuscles, each about the $\frac{1}{1000}$th of an inch in diameter, and sometimes termed "spermatophori;" and of spermatic filaments or spermatozoa, easily recognized by a magnifying power of some 400 diameters, owing to their tadpole-like form and rapid vibratile movements. To detect these bodies in urine, this secretion should be allowed to repose in a conical glass, the lower part of the sediment being afterwards removed to a glass slide with a pipette. When the seminal fluid is abundant it will possibly render the urine slightly albuminous. In spermatorrhœa, there may be simply a repeated escape of seminal fluid; or this is found associated with morbid changes in the vesiculæ seminales, ejaculatory ducts, bulbous portion of the urethra, and prostate gland. The coexistence of the latter occurs more frequently where the disease is due to gonorrhœa, than where it has its origin in self-abuse. The mere occasional presence of spermatozoa in the urine, is of course of no consequence. But in the cases under consideration there are repeated escapes of semen, often by day as well as by night; while the passage of the urine or the straining to empty the rectum may produce a flow. Where this occurs, the secretion often consists of an imperfectly elaborated fluid,—one loaded with epithelial débris and defective in true spermatic elements.

The shameless miscreants who are allowed to distribute indecent tracts, and in other ways to spread their nets for victims, always pretend to make a microscopic examination of the urine. They then direct the sufferer's attention to the great number of spermatozoa to be seen. Of course, considerable alarm is experienced as a multitude of lively animalculæ are seen twisting about in all directions. This alarm would be of short duration, however, were it but known that the interesting specimen merely consists of a little sour paste containing the common vinegar eel (*Anguillula aceti*); whose filiform body, rather more than half a line in length, is the innocent cause of much gross lying and thieving.

The *consequences* of spermatorrhœa are general weakness, with nervous irritability. There is mental depression; as well as a desire for a dreamy kind of existence, rather than a wish to follow any active occupation. The digestive organs frequently get disordered, as is indicated by flatulence and constipation; the sense of hearing, and not uncommonly of sight, becomes dulled; there is loss of memory, and an inability to fix the attention; while attacks of palpitation, giddiness, shortness of breath, headache, and neuralgia are far from uncommon. In extreme instances I believe the final result may be epilepsy, phthisis, insanity, or impotence. That these views are not imaginary I could prove by the recital of cases which have

fallen under my observation. But I have met with none where there has been a more striking appearance of cause and effect than in the following: For several years I have attended a family of four persons, two brothers and two sisters; all were single, and would now (1869) be above thirty-eight years of age. Both the brothers were brought up to the church: one died about four years ago from tubercular phthisis, the other is an inmate of a private lunatic asylum. One of the sisters is a confirmed invalid, always suffering from some form of hysteria, or from neuralgia, or from great mental and physical prostration. She lives alone, and persists in doing so. These three members of this family have not only confessed to practicing masturbation, but have regarded it as the origin of all their troubles. The second sister enjoys tolerably good health, though she has a fibrous tumor of the uterus of considerable size. With regard to the cause of the latter I can say nothing. Nevertheless, it is probably true that frequent sexual excitement, without impregnation, is a cause of chronic uterine and ovarian congestion, which may go on to the production of either uterine or ovarian tumors; though I am not prepared to say that such a cause has been brought into play in this instance.

As typical of another class of cases, which are of comparatively frequent occurrence, I would give such a sketch as this: A young man, about 25 years of age, has never had sexual intercourse, but he confesses to having occasionally practiced masturbation since he was thirteen or fourteen years of age. His penis is normal; both testicles are of a proper size, they feel healthy, and they are situated in the scrotum. He enters into a matrimonial engagement; but unfortunately a period of eighteen months or two years must elapse before he can fulfil his contract. During this interval he sees his future wife daily, and in spite of his resolve not to encourage any feeling of excitement, yet repeatedly he suffers from seminal emissions. At the time of marriage, he is nervous, weak, and has fits of mental depression; while his wedding trip is rendered perfectly miserable on finding that immediately he attempts to have connection an emission takes place and the erection ceases. Night after night his efforts prove unavailing; until at the end of two or three weeks he becomes thoroughly ashamed of himself, afraid of his wife's female relations, and terribly depressed. It is cruel and absurd to tell such an individual that he has nothing the matter with him; that he is hypochondriacal; and that such a disease as spermatorrhœa has no existence. To do so is merely to send him to some rogue who will draw a terrible picture of the result of his weakness, and rob him to the utmost possible extent. The truth is that the patient has not the power he needs; and this power can only be given to him by well-directed medical treatment.

The *treatment* of spermatorrhœa is not to be regarded as a subject beneath our consideration. At the commencement, it is necessary to obtain the confidence of the patient; so that while we calm his excessive anxiety, we may also impress him with a belief in our power to effect a cure, if he will but carry out the directions which are given. He ought to be urged to read no books on the subject of his disorder, to work earnestly, but not immoderately, at his occupation, to seek cheerful society in the evening, to take a proper amount of exercise, to sleep upon a mattress, and not to remain in bed for more than eight hours, not to indulge in heavy meals, and (as a rule) to avoid smoking and the use of alcoholic drinks. Supposing the emissions take place when he lies upon his back, as they often do, he should tie a cotton reel over the middle of the spine, so that he may awake directly he assumes this unfavorable position. The bowels must be regulated by the exhibition of simple aperients (F. 165, 169, 194), provided

attention to the diet and the use of ripe fruits fail to procure an easy evacuation every day. If there are prominent symptoms of nervous depression, a mixture of phosphoric acid, tincture of nux vomica, and bark (F. 376) will prove very serviceable; or a pill of sulphate of zinc and extract of nux vomica (F. 409) may be ordered. When the patient is unmarried, I generally avoid giving steel in any form; inasmuch as this medicine often produces congestion of the sexual organs, and so keeps up the irritation, which it is our object to subdue. But where the man is married, and is unable to have intercourse, a mixture of quinine and iron (F. 380) will be unobjectionable. A tepid salt water sponge-bath had better be taken every morning; while the glans penis is to be washed so as to remove the secretions of the sebaceous glands. The use of a suspensory bandage is often beneficial. Where the emissions are not very frequent, this plan of treatment will suffice; but in the more severe forms of spermatorrhœa we may have to prescribe, in addition, cod-liver oil, a moderate allowance of wine or bitter ale, the use of milk instead of tea or coffee, and to recommend a holiday, with residence at the seaside. If any sedative be needed, a pill containing camphor with small doses of conium and belladonna (F. 326) will often exert a favorable influence. And, then, if there be any disease about the rectum, or if there be indications of the presence of oxyurides, or if there be irritability of the bladder, or if the urine be excessively acid, the necessary steps for effecting a cure of these affections must be taken.

With regard to local treatment, I can only say that I believe the instances in which it is called for are very exceptional. At the same time, I have seen cases where a good effect seems to have been produced by the introduction of a metallic sound into the bladder once or twice a week. The application of nitrate of silver to the prostatic portion of the urethra, by means of Lallemand's porte caustique, has been highly spoken of by gentlemen of great experience; but if it be used the patient ought to remain quiet for a day or two after the application, he should be kept on a milk diet, and he must be told that it will give rise to considerable irritation with the passage of bloody urine. Where there is extreme relaxation, galvanism deserves a fair trial. And lastly, it must be remembered, that when a cure has been effected, moderate sexual intercourse tends to maintain the general health; although, if the practitioner feels it his duty to recommend marriage, he should give a warning as to the mischief which will inevitably result from "a long engagement."

XI. DISEASE OF THE SUPRARENAL CAPSULES.

The suprarenal capsules have long been objects of great interest to the anatomist and physiologist; for though they probably perform some important office in the animal economy, yet at present that office has been but vaguely guessed at. Hence we must be content for the time with believing that they serve in some way to minister to the elaboration of the blood, in common probably with the other ductless glands—the spleen, thymus, and thyroid bodies; though the exact nature of their functions, or the manner in which they perform them, cannot even be surmised. All that we know is, that the comparative size of the capsules depends upon the age: they are larger than the kidneys in the embryo, about an equal size in very young children, and only about the twentieth part as large in the adult. Indeed, in the latter, they are sometimes so small that they

can hardly be found, though their minute structure is unimpaired. When healthy, they have a yellowish-red color, are from one and a half to two inches in length, are rather more than an inch in breadth, while they weigh between sixty and one hundred and twenty grains. They have an outer or yellow cortical substance, made up of elongated vesicles, imbedded in a fibrous matrix; and an inner, or soft brown medullary structure, described by Dr. Harley as consisting of fibrous tissue, arranged in a reticulated manner, and having its meshes occupied by a number of large pale-colored cells with round nuclei. The arteries supplying the suprarenal glands are numerous and of considerable size; while the nerves are abundant, have many small ganglia developed on them, and are chiefly derived from the solar and renal plexuses.

The obscurity which surrounds these organs has not been dispelled by the discovery of Dr. Addison, that certain examples of severe anæmia, with a peculiar discoloration of the skin, are due to (or at least are accompanied by) disease of these capsules.* Dr. Addison, having observed that cases of marked bloodlessness occasionally came under his care, generally terminating fatally, and presenting certain prominent characteristics, such as excessive and progressive weakness, a feeble and perhaps rapid pulse, faintness on the least exertion, pain in the epigastrium, shooting through to the space between the scapulæ, a pearly white appearance of the conjunctivæ, loss of appetite, sickness, flabbiness of the frame rather than emaciation, with a brownish or "singular dingy" discoloration of the whole surface of the body; and finding that no adequate cause (as *e. g.*, loss of blood, diarrhœa, chlorosis, purpura, or renal, splenic, strumous, or malignant disease) could be discovered, for these important symptoms, he gradually seems to have imagined that the fault existed in the suprarenal capsules. Having "stumbled" upon a clue, he set to work to confirm his discovery; and then the more numerous the cases he examined, the stronger his convictions grew.

As in most cases of anæmia, so in the present form (admitted into the nomenclature report of the Royal College of Physicians under the name of *Addison's disease*, or *Bronze skin*, or *Melasma Addisoni*), the disorder commences almost imperceptibly with symptoms of failing health and debility. The patient becomes languid and weak, the pulse gets feeble, and the appetite impaired; while the stomach is irritable, the whites of the eyes are pearly, and the body is flabby. Occasionally, there is urgent gastric disturbance with vomiting; there are often lumbo-abdominal pains; while at times there are headaches and attacks of vertigo, with other indications of disturbed cerebral circulation. With all or most of these symptoms, for which no adequate cause can be found, Dr. Addison thought that a gradual discoloration took place in the skin; most marked usually about the face, neck, superior extremities, penis, scrotum, the flexures of the axillæ, and the tissue around the navel. The skin, in the cases which formed the basis of the observations, was seen to be of a dingy or smoky hue, the depth of color being variable; sometimes slightly marked, and occasionally, as in one instance, "so universally and so deeply darkened, that, but for the features, the patient might have been mistaken for a mulatto" (p. 5). It is worthy of remark that the discoloration gradually appeared to increase; becoming more marked as the other symptoms acquired greater prominence, and as the disorder approached to its fatal termination. In only one of Dr. Addison's recorded cases does the blood seem to have been examined mi-

* On Diseases of the Suprarenal Capsules. By Thomas Addison, M.D., &c. London, 1855.

croscopically; on which occasion a considerable excess of white corpuscles (leucocythæmia) was found to exist.

Since the publication of Dr. Addison's researches, cases of renal-capsular disease have been recorded where there has not existed any discoloration of the skin during life. It is now said, therefore, that the discoloration is not a necessary element of the affection, for it appears to occur only when the case has been of long duration; while, when present, it implicates the entire surface of the body, though it commences in the parts most exposed (as the face and hands), and is more marked in the axillæ, over the pubes, &c., than elsewhere. But, again, it is certain that there may be the most extensive pigment-deposit in the rete mucosum of the skin, without the slightest trace of disease being found after death in the suprarenal capsules. A man died in University College Hospital in the winter of 1858, whose skin had been gradually darkening for a few months previously; the "bronzed" condition being most marked on his admission. It was supposed to be an excellent example of morbus Addisoni, till the scalpel and microscope proved that there was no trace of disease in either capsule.

Blumenbach has quoted from Bomare the case of a French peasant, whose abdomen became entirely black during each pregnancy; while Camper mentions the case of a lady who began to get brown as soon as she became pregnant, and before the termination was as black as a negress. After delivery the color gradually disappeared. I have also a patient whose skin becomes of a notably darker color during each menstrual period; though at other times it is darker than it was a few years ago, since which time she has gradually been becoming anæmic. It seems to me that some light might possibly be thrown on this subject by carefully weighing and examining the suprarenal capsules in women who die during pregnancy. The opportunity of doing this has only happened once to me. In this case, death occurred from flooding due to separation of the placenta, about a week before the completion of the full term of pregnancy; and in this instance the capsules were evidently enlarged, though they looked healthy. Each mammary areola was unusually dark.

Taking a fair view of the present state of our knowledge, it must be admitted that we are not yet justified in giving an unqualified assent to Dr. Addison's views. And the difficulty has been somewhat increased owing to the opinion advanced by Dr. Wilks, that suprarenal melasma is due only to one form of disease affecting these organs; for if this hypothesis be true, not a few of the cases which have been recorded by independent observers as corroborative of Dr. Addison's statements cease to have any value. Although, therefore, very plausible arguments can be advanced in favor of the main facts insisted upon by Addison, yet further evidence is required before it can be positively affirmed that the association between a certain set of symptoms and a certain variety of suprarenal capsular disease is not accidental.

The suprarenal capsules may suffer from many forms of disease. Thus, occasionally these glands are destroyed by some adventitious deposit, the nature of which can hardly be made out: sometimes there is complete atrophy of one organ, with enlargement and softening of the other: sometimes there has been a deposit of tubercle in one, with a collection of pus in the other: while in other instances there has been fatty degeneration of both glands, or sanguineous engorgement, or apoplexy with one or more centres of extravasation. And, again, one or both of these bodies have been found infiltrated with cancer. But according to Dr. Wilks,* it is

* On Disease of the Suprarenal Capsules; or Morbus Addisoni—Guy's Hospital Reports. Third series, vol. viii, p. 1. London, 1862.

important to remember, that in true melasma Addisoni the organs get enlarged, and changed into a semi-translucent, gray-colored, soft and homogeneous material; which afterwards degenerates into a yellowish-white opaque matter, and subsequently softens into a putty-like matter, or dries up into a chalky mass. The other affections of the capsules do not produce Addison's disease; though it is rather difficult to understand how they can fail to do so, if, as Drs. Addison and Wilks have tried to prove, the symptoms of melasma suprarenale are to be referred to some failure of nervous force acting on the heart, induced by the injury to the ganglionic system of nerves. The duration of life, after the first appearance of the symptoms, has varied in the recorded cases from six months to five years; but according to Dr. Wilks the average is about eighteen months.

The *treatment* of this affection, whatever its true nature may be, is particularly unsatisfactory, almost all the examples having terminated fatally. Until our pathology becomes more perfect, we can do little more than attempt to remedy the prominent symptoms—the bloodlessness and prostration, the lumbar pains and vomiting, the head symptoms, &c.; for which purpose the various preparations of steel should be tried, combined with the most nourishing kinds of food that can be taken.

XII. IRRITABILITY OF THE BLADDER.

Irritability of the bladder is said to exist when an individual is troubled with a much more frequent desire to pass urine than is natural. This condition not uncommonly arises from organic disease of the kidneys, bladder, prostate gland, or urethra; such as inflammation, abscess, tumor, cancer, stricture, and so forth. It may likewise be due to the pressure of the uterus when misplaced (as in anteflexion), or when enlarged from pregnancy or the growth of a fibroid tumor, or when diseased from infiltration with cancer; or it may be connected with the presence of a tumor or a calculus in the bladder; or it can be originated by the irritation of hæmorrhoids, by cancer of the rectum, by a painful ulcer of the sphincter ani, or by an abscess at the side of the rectum. Lastly, it may prove, as it very often does, to be merely functional; *i. e.*, dependent on some morbid state of the urine owing to temporary derangement of the digestive organs or kidneys or bladder, or on some constitutional nervous affection.

Symptoms.—The desire to micturate comes on suddenly and very frequently, so that in many cases a patient has to pass urine every thirty or forty minutes. There is generally an inability to resist the desire; but if this can be checked, uneasiness and pain are induced by doing so. The urine is seldom increased in quantity, except in hysterical subjects: in the latter the increase is often considerable, and the secretion is pale and very watery, the proportion of solid constituents remaining as in health. After this affection has lasted some time, the bladder often diminishes very much in size; so that instead of being able to contain from fifteen to twenty ounces of urine as in health, it cannot hold more that two or three ounces.

In all cases the urine should be examined. Where it is found preternaturally acid or alkaline; loaded with urates, or phosphates, or oxalates; or when it contains pus, albumen, sugar, or any other morbid secretion, the disease must be traced to its origin. For under these cir-

cumstances the irritability of the bladder is a mere symptom of either some severe constitutional derangement or else of dangerous organic disease.

Incontinence of urine in children is frequently due to simple irritability of the bladder, or to the presence of worms in the rectum, or it may be associated with albuminuria, or with diabetes, or with the uric acid diathesis, or it will be simply the natural consequence of the child being put to bed for twelve hours without being roused at proper intervals to pass water. When there is an involuntary flow of urine in the adult, it is almost always indicative of an overloaded bladder from paralysis of the muscular coat.

Treatment.—In simple irritability of the bladder, not of long duration, attention to regimen generally, the avoidance of all stimulating drinks, the substitution of cocoa or chocolate made with milk for tea and coffee, the free employment of mucilaginous diluents, and the use of warm or tepid salt-water baths, will often effect a cure. The dilute nitro-hydrochloric acid in decoction of pareira, with or without the tincture of belladonna (F. 378), is very efficacious when the urine is alkaline or only slightly acid; where the secretion is abnormally acid, small doses of liquor potassæ in infusion of buchu (F. 69) do great good. Sir Henry Thompson has also recommended a decoction of the triticum repens or couch-grass made with one ounce of the underground stem to a pint of water, the whole of which is to be taken in the twenty-four hours. Opiate suppositories at bedtime, or five or eight grains of the extract of henbane in a pill, or ten or fifteen minims of tincture of belladonna in infusion of linseed, will lessen the irritability, and allow of a good night's rest.

Ferruginous tonics should be ordered where there is general debility, or when the irritability comes on in young females at the catamenial periods. In a few obstinate cases the tincture of cantharides, with or without the tincture of the perchloride of iron, has relieved all the symptoms after other means have failed. Moreover, in women the employment of vaginal pessaries of belladonna and oxide of zinc (F. 423) will frequently prove most serviceable.

The troublesome involuntary flow of urine during sleep, which is so common in young children, may result from any of the causes of incontinence; hence, in all cases of the kind the renal secretion should be examined. But usually this affection is the consequence of bad habits, being favored by the free use of fluids during the after-part of the day, by exposure to cold in the night, and by lying on the back—a posture which seems to be very unfavorable to the retention of the urine, especially when the natural sensibility of the mucous membrane of the neck of the bladder is at all increased. The disorder can usually be cured by making the little patient almost abstain from fluids for three or four hours before going to bed, by waking him to empty his bladder twice or thrice during the night, by tying a cotton-reel over his spinal column, so that when he turns round upon his back he may at once be awoke, and by giving strength and tone to his system by the administration of the tincture of the perchloride of iron with small doses of belladonna. In some inveterate cases the application of a succession of small blisters over the sacrum has effected a cure, but such agents should be avoided, if possible. Where the bladder is very irritable, a belladonna plaster over the loins and sacrum will often be very useful; or three or four grains of the extract of this drug mixed with some glycerin or starch should be spread over the same region every night, or the belladonna liniment properly diluted can be employed. Where there is a weakly condition of the general health, a tepid salt-water bath every

morning, with the administration of cod-liver oil, may also help to effect a speedy cure. If there be any intestinal irritation, it must be removed, while any errors of diet or mal-assimilation of food ought to be rectified.

A common cause of irritability of the bladder in young boys is the presence of a long prepuce with a very small orifice. Sometimes the symptoms produced by this condition are so severe as to give rise to the suspicion of calculus. In such cases the most marked and effectual relief will be afforded by resorting to circumcision. Drugs are certainly quite useless.

XIII. SPASM OF THE BLADDER.

Like other muscular organs, the bladder is subject to spasmodic attacks of pain.

Symptoms.—The patient complains of severe pain at the lower part of the abdomen, and along the urethra to the extremity of the penis. The urine may be passed involuntarily, but generally it is retained, there being a constant desire to micturate without the power to do so. Frequently, also, there is tenesmus.

When the spasm has been of long continuance, death has resulted, with all the symptoms of suppression of the urine. In these cases the vesical extremities of the ureters have been found spasmodically closed; while the tubes themselves have been dilated by the accumulated urine, the increased dilatation sometimes extending to the pelvis of each kidney. Care must be taken not to confound spasm with inflammation of the bladder; in the latter the pain is constant, lancinating, and throbbing; while there is also general fever and great disturbance.

Causes.—Stone in the bladder is one of the most frequent causes of violent paroxysms of spasm; malignant vesicle tumors also produce them; and they are not uncommon in diseases of the rectum and uterus. So far as the bladder is concerned, a fibroid tumor in the anterior wall of the uterus will cause almost as much spasmodic pain as if the morbid growth had its seat actually in the coats of the bladder. In cancer of the womb the bladder gets contracted and morbidly sensitive long before an examination can detect any structural disease in it. Dr. Prout says that spasm of the bladder may arise from the presence of abnormally acid urine, as in gout; or from an abscess of the kidney; or from ulceration or other organic diseases of the bladder, prostate gland, &c.; or from the use of irritating diuretics, as cantharides; from excessive venery; from hysteria; and from disorders of the intestinal canal, especially, perhaps, from the irritation of oxyurides.

Treatment.—Two indications present themselves, viz., the immediate relief of the spasm, and the removal of the cause. The first will be best accomplished by the hot bath, or by fomentations until a bath can be obtained; as well as by the administration of a full dose of some narcotic either by the mouth or by the rectum. The removal of the cause is more difficult. Where the patient is gouty and the urine loaded with urates, colchicum and soda or potash water will do much good; while at the same time attempts can be made to induce an attack of gout in the foot by the application of sinapisms, or by the use of stimulating pediluvia. In abscess of the kidney, the symptoms must be palliated as they arise; the strength being kept up by mild nourishing food, cod-liver oil, change of

air, &c. When a vesical calculus is present, the physician can only give temporary relief until a surgeon takes the necessary steps to crush or extract the stone. Supposing the spasm to be due to sympathy with a contiguous organ, the disease of which cannot be removed, frequently repeated doses of the tincture of perchloride of iron often prove of great service. Camphor mixed with a linseed poultice and applied to the perineum, is also said to be frequently serviceable; or a hemlock poultice may be tried. But the quickest relief will be obtained from a mixture containing ether and morphia and belladonna (F. 315); or especially from an opiate and belladonna suppository (F. 340).

In every case the diet is to be regulated. Simple nourishing food, an avoidance of all stimulants, a free supply of milk, and plenty of mild mucilaginous drinks, should be recommended. The patient also ought to wear flannel next to the skin, to protect himself from sudden changes of temperature; while he must avoid sexual intercourse, riding on horseback, and every kind of violent exercise.

XIV. PARALYSIS OF THE BLADDER.

The muscular coat of the bladder may become paralyzed from some influence confined to this viscus; or from disease of the nervous centres, inducing loss of muscular power in other parts of the body; or from constitutional debility arising from any cause.

Causes.—The paralysis may be due to overdilatation of the muscular coat of the bladder. Thus, a sensitive individual from some cause (as being in the company of the opposite sex, or from being shut up in a railway carriage) is unable to micturate when the desire is felt; and then, on afterwards attempting to do so, it is found that the power is completely lost.

The paralysis may also be a consequence of apoplexy, or of injuries to the head, or of injuries or diseases of the spine.

It is, generally speaking, a disorder of old age, and seems particularly to attack gouty and rheumatic persons. Not uncommonly it is connected with disease of the neck of the bladder; or with enlargement of the middle lobe of the prostate gland.

Women who have had large families, and especially such as have experienced severe labors, ofttimes suffer from paralysis of the neck of the bladder; so that they are either unable to retain the urine at all, or it comes away involuntarily on laughing and coughing, or on making any sudden exertion. The same thing is apt to happen with very obese women. Time, astringent vaginal injections (F. 425), pessaries containing a little tannic acid (F. 423), cold hip baths, and ferruginous tonics, often effect a cure.

Symptoms.—Unlike the rectum, the bladder retains its contents when paralyzed; this phenomenon being due to some peculiarity in the neck of the bladder not possessed by the bowel. The sphincter vesicæ consists only of pale muscular fibres mixed with elastic tissue placed round the neck of the bladder; the elastic tissue modifying materially the action of the muscle. "The same loss of power," says Mr. Coulson, "which allows the escape of fecal matter through the paralyzed sphincter ani, does not affect to a similar degree the sphincter vesicæ, whose elasticity, inherent in the

tissue itself, and not dependent upon nervous influence, retains closed the vesical orifice when the rest of the organ is paralyzed."*

When the bladder gets overdistended the urine dribbles away by the urethra, the resistance to its escape at the neck of the bladder being overcome when the walls are incapable of further dilatation. Hence incontinence of urine is often the prominent symptom of retention, of which fact the following is a good illustration: Mr. Lawrence was one day sent for to see a case of supposed irritability of the bladder. The medical practitioner in attendance stated that he had been doing all in his power to allay the irritability, but that his efforts were unavailing, for the urine passed off as quickly as it entered the bladder. On examination, Mr. Lawrence felt the fundus of the bladder forced up some way above the umbilicus: he introduced a catheter, and five pints of urine were withdrawn. The truth was, that the bladder had been allowed to become distended for about five days, and in consequence of this, unfortunately, the patient never afterwards recovered the natural power of emptying this viscus. I have several times seen cases where alarming symptoms have set in about the third day after parturition, owing to the excessive accumulation of urine, the practitioner in attendance having failed to perceive the true nature of the case, because the patient was complaining of constantly passing water. The introduction of a catheter, however, has speedily removed all doubt, as tumblerful after tumblerful of urine has been drawn off. The paralysis seldom lasts for more than two or three days subsequent to the proper treatment being resorted to; but the catheter should be used every eight or twelve hours until it is certain that the patient completely empties the bladder upon each attempt at micturition.

In most cases of paralysis of the bladder the urine is found loaded with mucus; while it is of a highly offensive ammoniacal odor, of an alkaline reaction, and it has an excess of phosphates—the neutral triple phosphate of magnesia and ammonia. It is highly probable that the urine, when secreted, is of acid reaction; but on flowing into the bladder it becomes mixed with a greater or smaller quantity of fluid which has been retained a sufficient time to undergo decomposition, and hence the fresh secretion gets contaminated. In injuries of the spinal cord the vital power of the walls of the bladder is so lowered that the urine readily becomes decomposed. The urea is converted into carbonate of ammonia; while the ammoniacal urine inflames the vesical mucous membrane, so that the latter secretes a remarkable quantity of viscid ropy mucus. If the patient survive, the inflammation may extend to all the coats of the bladder.

One of the earliest symptoms of paralysis of the bladder is pain at the neck of this viscus and in the glans penis; but after a time little or no uneasiness is complained of, and as the bladder loses its sensibility even the desire to void urine is not experienced. The constitutional disturbance is usually severe; the pulse is rendered quick and feeble, the tongue gets furred, the appetite fails, the nights are restless, there is great mental depression, and the vital powers become greatly lowered. Frequently the patient sinks into a state of stupor, and dies from uræmia or from exhaustion.

Treatment.—Where the paralysis depends upon overdistension of the bladder the catheter must be introduced; although it is sometimes advisable to be careful not to withdraw the fluid too rapidly, since fatal collapse is said to have occurred from the sudden abstraction of a large quantity of urine. When the paralysis continues the patient should be taught to intro-

* On Diseases of the Bladder and Prostate Gland. Fifth edition, p. 98. London, 1857.

duce the catheter for himself, using as large a one as the passages will freely allow. Especially should he be cautioned always to withdraw every drop of urine; inasmuch as that which is retained will after a time become decomposed, and not only contaminate the fresh secretion as it flows from the ureters, but also give rise to most serious changes in the mucous and other coats of the bladder. The instrument should be passed about every six or seven hours. Now and then the bladder had better be washed out with warm water.

To restore the contractile power of the bladder various remedies have been recommended. In recent cases the use of the catheter occasionally suffices to give tone to the vesical walls; sometimes cold water injections, as recommended by M. Civiale, prove beneficial; and good results are, in many instances, to be obtained from small doses (the one-twelfth of a grain twice daily) of strychnia, or from the use of the ergot of rye. Galvanism, cold douche and hip baths, blisters over the lower part of the spine, quinine and iron, and aloetic purgatives, are also remedies that can be often resorted to with advantage.

When there is disease of the brain or spinal cord we can seldom hope to do much good beyond taking care that the bladder does not become distended; at the same time attempting, as far as possible, to combat the symptoms as they arise.

XV. INFLAMMATION OF THE BLADDER.

Inflammation of the bladder, technically known as cystitis or cystorrhœa, is not a very frequent disease. Probably one reason for this is, that directly any morbid action is set up in this viscus advice is eagerly sought, since the symptoms at once become urgent. Of the two forms of inflammation the acute is much the most uncommon. The chronic variety falls under the observation of every practitioner, and often gives him much trouble in his attempts to effect a cure.

Acute or chronic cystitis may now and then complicate uterine affections in women; or either will result from a tedious labor, owing to the long-continued pressure of the fœtal head.

1. ACUTE CYSTITIS.—Acute inflammation of the bladder, or cystitis [*Κύστις* = a bladder; terminal *-itis*], is a severe disease which occurs under a variety of circumstances. The morbid action is generally confined to a portion of the mucous surface, the neck and bas-fond being the parts most frequently affected; but in severe cases the whole bladder and all its coats are attacked.

Causes.—This disease now and then arises as an idiopathic affection; in the great majority of cases, however, it supervenes on long-existing chronic inflammation. It may have its origin in the extension of inflammation from the urethra, or from some of the pelvic viscera, or from the connective tissue (pelvic cellulitis). Gonorrhœa, in men, is a frequent cause; and so are caustic injections to the urethra. Cystitis can also be produced by external violence, as by wounds; by the pressure of tumors of the uterus or ovary, or of effusions of blood (pelvic hæmatocele); or it will be found due to the irritation of some foreign body, as a calculus, or to the abuse of diuretics, cantharides, &c. Protracted retention of urine has undoubtedly set up fatal cystitis; the inflammation being partly a consequence of the distension, and partly a result of the irritating effect of the urine.

Symptoms.—The symptoms of acute cystitis are the following: Shivering, considerable pain over the bladder, and heat of the urethra; together with a constant desire to pass urine, which is voided in very small quantities at a time. There is likewise high fever, nausea, mental depression, and general constitutional disturbance. The bladder can often be felt, on making pressure over the lower part of the abdomen, as a small and rounded tender tumor. The pain is usually very severe, extending along the perineum and urethra, as well as down the thighs; while it is much increased by pressure upon the lower part of the abdomen, or by examining the posterior wall of the bladder through the rectum. Moreover, this pain diminishes in severity directly the bladder is emptied; but as soon as a small quantity of urine collects the suffering recommences, becoming more and more severe until the desire to micturate is rendered so irresistible that the patient feels compelled to respond to it. Frequently, the irritation extends to the rectum; and then the sufferer is annoyed with tenesmus and evacuations of mucus tinged with blood.

Unless the progress of the inflammation be controlled in the course of two or three days, the pain becomes unbearable, the calls to micturate are constant, the urine is expelled in drops, and the walls of the bladder lose their power, so that an accumulation of urine takes place. This secretion is found high-colored, perhaps fetid and alkaline, and sometimes loaded with shreds of fibrin entangling pus and blood-corpuscles. As the morbid action continues, the neighboring tissues get involved in the inflammation; the ureters, prostate, vagina, or pelvic connective tissue may become affected. The constitutional disturbance rapidly increases, considerable prostration ensues, cold clammy sweats cover the body, the pulse becomes very feeble, low muttering delirium sets in, and death relieves the sufferings between the seventh and twelfth days. In less violent cases resolution sometimes takes place, and the patient recovers; or the inflammation (if limited in extent) ends in softening of the mucous membrane with ulceration, and then gives rise to much pain and disturbance subsequently.

A few curious cases have been recorded where the whole mucous lining of the bladder has been thrown off in one piece. In the museum of the Royal College of Surgeons there is a preparation (Pathological Specimens, No. 1993) which illustrates the correctness of this remark. The history of the patient, communicated to me by my kind old friend, the late Dr. Knox, was as follows: A man seventy years of age, living in Edinburgh, fell from a scaffold, and, in consequence of the injuries received, suffered from retention of urine. The catheter was introduced frequently, and a thick, puriform fluid drawn off by it. At the end of the third week, however, nothing would pass through the instrument, while the point of it could be felt to impinge upon a membrane. To relieve the man's sufferings, the late Mr. Liston, assisted by Dr. Knox, cut into the bladder from above the pubes, and thus allowed a large quantity of purulent fluid and a membrane to escape. The patient lived for three months afterwards, discharging his urine partly through the wound and partly through the urethra. At the end of this time he died from exhaustion. On examining the layer of membrane, as it is found in the Museum, it is seen to be of a saccular form; measuring about six inches in its longer and four inches in its shorter diameter. The shape indicates that it lined the whole interior of the bladder, and was thrown off from it in one piece. The outer surface is flocculent, and in parts distinctly fibrous; the inner surface is granular and reticulated, like superficially ulcerated mucous membrane. In fact, as the College Catalogue says, it exactly resembles the mucous membrane of a bladder, separated as a slough in one piece.

Treatment.—The remedies mainly to be relied upon are those which have been recommended in the inflammatory affections of other organs; especially large poultices, very hot poppy fomentations, and often repeated hot hip baths. The mildest aperients (such as castor oil) ought to be employed to keep the bowels gently open, if there be any evidence of the retention of unhealthy secretions. Then a catheter must be used frequently if there are symptoms of retention of urine, but not without. The diet should be very light, with a moderate quantity of mucilaginous fluids—such as barley-water, linseed tea, milk, arrowroot, mucilage of tragacanth, &c. Tea, coffee, and all alcoholic drinks, are to be avoided. As regards drugs, none will be found so useful as opium and belladonna. These agents should be used as suppositories (F. 340) if possible in men; although in women they prove much more efficacious when introduced into the vagina as pessaries (F. 423). Should a calculus prove to be the cause of the inflammation, the surgeon will probably wait until the morbid action is subdued before he ventures upon lithotrity or lithotomy.

2. CHRONIC CYSTITIS.—This form of inflammation, now and then spoken of as vesical catarrh, is far from uncommon, inasmuch as it is readily excited by numerous causes. It is sometimes the sequel of an acute attack. More often it results from some poison in the system, as that of gout or rheumatism; or it is not unfrequently due to the retention of decomposing urine (perhaps the consequence of spinal paralysis), or to the irritation of urine charged with saline diuretics; or it may have its origin in disease of some neighboring viscus—as the rectum, or uterus, or vagina; or it may be caused by any foreign substance in the bladder, whether this be a simple or malignant tumor or a calculus. Old men, more frequently than old women, suffer from chronic cystitis, especially during cold weather, or if they are much exposed to damp. The irritation may extend from an enlarged prostate.

In simple cases, there will be merely a general sense of indisposition, an increased sensibility of the walls of the bladder, a dull kind of aching about the pelvis, and a frequent desire to pass urine; the latter being generally scanty, and containing a small quantity of mucus or pus. But sometimes the secretion of the lining membrane becomes very greatly increased (catarrh of the bladder), and then the urine deposits a large amount of semitransparent, viscid, and ropy matter. This adheres to the sides of the vessel containing it, and on being poured out falls away like a gelatinous mass; while it consists either of mucus, or of pus which has been modified by the admixture of an alkali.

On attempting to cure these cases, it is of the first importance to remove the cause if possible. Then care must be taken to prevent further irritation of the mucous membrane by not allowing the urine to be retained, as it very soon becomes alkaline; and with this object the bladder should be frequently emptied by the catheter. Great relief is often derived from washing out this viscus with three or four ounces of warm water; or with six or eight ounces of water containing twenty grains of extract of henbane, with three or four of extract of opium, allowing at least one-half of the fluid so medicated to come away; or, where an astringent seems needed, with a mixture of acetate of lead or tannic acid in warm water. The strength of the injection should be such as to impart a styptic taste to the tongue.

Amongst the general remedies which may be administered, are the infusions of bearberry (infusum uvæ ursi) and buchu; or the decoctions of pareira and couch-grass. Demulcent drinks are also serviceable, espe-

cially the decoction of Iceland moss, or plain barley-water, or the infusion of linseed. A suppository of opium and belladonna (F. 340) at night, will often procure refreshing sleep; but in women, a medicated pessary containing the iodide of lead or the oxide of zinc, with belladonna (F. 423), has seemed to me to act more favorably. Moreover, the application of a belladonna plaster over the sacrum is sometimes the source of considerable relief; or if we wish to produce counter-irritation (which will very rarely be the case), we can employ the croton oil, or the iodine liniment. In all cases nourishment must be given freely; animal food, raw eggs, and as much milk as can be digested being needed. Tea and coffee generally do harm, while alcoholic stimulants should only be prescribed where there is much depression, or where the patient is aged and has habituated himself to their use. If the digestive organs are weak, the administration of pepsin with the chief meals will be necessary; and as exercise must generally be forbidden, one of the preparations of this substance will very commonly be required.

XVI. TUMORS OF THE BLADDER.

The tumors which may be developed in the bladder are of the following kinds: Warty or polypoid fibrous bodies; villous or vascular growths, and malignant tumors, or infiltrations.

Whatever the nature of the tumor may be, it gives rise to symptoms very much resembling those caused by a stone in the bladder. There is frequent micturition; a painful feeling of inability to empty the bladder is complained of; while occasionally the urine is bloody, or purulent, or ammoniacal and loaded with mucus. Malignant tumors (either scirrhous, or more commonly medullary, or epithelial) are of much greater frequency than the innocent varieties; and though the cancerous deposit is generally primary, yet it may occasionally be the result of the extension and infiltration of disease from the vagina, uterus, prostate, or rectum. The suffering is always very great; the pain at the lowest part of the abdomen, in the loins, and about the thighs being constant. The urine is bloody, and often contains threads of tissue, while, perhaps, the diagnosis may be facilitated by the presence of cancer-cells. Until the constitutional cachexia becomes marked, the symptoms are apt to be mistaken for those produced by a calculus; and though, perhaps, it may be unavoidable, yet considerable mischief is now and then caused by the use of the sound. I well remember finding an eminent medical friend, now dead, suffering the greatest agony after a mass of medullary cancer at the base of his bladder had been roughly treated in the futile attempt to detect a stone.

As respects the treatment of these cases, we can do little more than relieve the prominent symptoms. Our chief reliance must, therefore, be placed on narcotics in sufficient doses to give repose, or on astringents where there is hemorrhage, as well as upon a nutritious diet. The polypoid fibrous, and the pendulous villous, growths, may occasionally be removed by ligature from the female bladder, owing to the ease with which the urethra can be dilated. But success has seldom attended these operations; partly, perhaps, for the reason that patients are often unwilling to submit to the necessary proceedings until great constitutional disturbance has set in. And then by the time that this has got developed, the ureters and pelves of the kidneys have generally undergone considerable dilatation; or they have even become the seats of suppurative inflammation, which can have but one termination.

PART XII.

DISEASES OF THE FEMALE ORGANS OF GENERATION.

I. DISEASES OF THE VULVA.

THE parts included under the term "vulva" [probably as if *Valva*, pl. *valvæ* = folding doors] consist of the external organs of generation,—the mons Veneris, the labia majora, the labia minora or nymphæ, the clitoris, the vestibule, the meatus urinarius, the orifice of the vagina, and the hymen stretching across the lower portion of this orifice in the virgin. The diseases of these structures are of considerable importance. They can seldom be correctly diagnosed without an ocular inspection; for making which it generally suffices to place the patient upon her left side, in the ordinary position for labor. Some practitioners prefer to have the woman upon her back, with the knees drawn up: but as an examination so conducted is revolting to a woman's feelings, it should only be resorted to in exceptional cases.

1. VULVAL PRURITUS.—Pruritus [*Prurio* = to itch] of the vulva may be only a symptom of some disease, or it will now and then occur as the sole local affection. This very troublesome disorder consists of a perverted sensibility of the nerves of the district. Like some other neurotic affections it is much more frequently met with in old age than in the earlier periods of life. I am inclined to think that it is more common in married women, than in those who have never had intercourse; although the soundness of this opinion cannot be demonstrated by a reference to numbers.

Causes.—When pruritus occurs as an idiopathic disorder it will frequently be found that the general health is far from good. The patient is pallid, complains of debility and lowness of spirits, and perhaps has been losing flesh. The appetite is bad; while the digestive organs act imperfectly, there is acidity with flatulence, the liver is torpid, and the bowels are apt to be confined.

Not uncommonly, the irritation is merely the symptom of some uterine disease; especially of displacement, or of excoriation around the os uteri, or of the early stage of carcinoma. A vascular tumor at the orifice of the urethra will give rise to almost intolerable attacks of itching about the vulva; and so will leucorrhœa in whatever way it is set up, chronic inflammatory affections of the vagina, and a dilated condition of the veins of the labia. Hæmorrhoids not unfrequently produce it. In the early stages of pregnancy it may prove very annoying; ofttimes the irritation continuing until after labor, and even until the complete cessation of the lochia. The commencement of each menstrual period, in many sensitive women, is

attended with itching about the pudenda, especially if the flow be scanty. Finally, irritation is not a very uncommon symptom at the climacteric period, when the catamenia appear irregularly before their final cessation.

An examination of the stools and of the urine had better be made in all obstinate cases of pruritus: of the former, so as to be sure that there are no threadworms keeping up the irritation; of the latter, lest there be any sugar present. I can scarcely believe that there is any connection between diabetes and pruritus, but every now and then the two are found to be coexistent.

Symptoms.—The sensation experienced is not always that of intense itching. Sometimes it is described as a tingling or smarting, with a feeling of heat about the parts; these symptoms being aggravated by spiced or heating food, and especially by alcoholic drinks. In other instances it is spoken of as a sense of creeping or formication, so that the patient will hardly believe that the parts are not infested with a number of disgusting insects. The irritation is so insupportable at times that the patient cannot refrain from scratching herself. Hence the vaginal labia, as well as the tissues about the perineum and vestibule and mons Veneris get red and excoriated; small scabs forming and increasing the evil. With other cases the parts are dry and angry-looking, while there are marks of the scratching produced by the nails. The long persistence of the pruritus likewise leads to actual alterations in the cutaneous tissues. On making an examination of the vulva, as well as on opening the vaginal labia, these parts are seen to be of a peculiar silvery color; often looking as if they were coated with a white metallic paint, which had not dried. The leucorrhœal discharge which is usually present aggravates the irritation, especially if this discharge be at all acrid; while it may also produce more or less swelling. Occasionally, pruritus appears to be a cause of erotic sensations—perhaps amounting to nymphomania.

Under all circumstances the irritation is much increased by warmth. Hence, the patient is unable to sit near a fire; but especially is she tormented at night, so that even in winter she may be obliged to have no covering beyond a sheet, or else to keep cold applications constantly over the parts. The want of rest, the loss of appetite, and the almost constant annoyance greatly depress the general powers; while the desire to resort to friction, though it affords only temporary relief at the cost of aggravated suffering afterwards, is so great that the sufferer cannot bear to be long in the company of even her own family.

Diagnosis.—The itching of prurigo may be mistaken for that of pruritus. But the former disorder is more rarely met with than the latter; while the papular eruption of prurigo, seldom confined to the genital organs, is very characteristic. The irritation produced by lice, as well as that caused by the itch animalcule, closely resembles that of pruritus; and therefore we ought to make certain that these insects are not the source of the annoyance. In follicular inflammation of the vagina a sense of smarting, rather than of itching, is complained of; though the latter, as will presently be shown may also prove troublesome. Chronic eczema of the vulva is attended with distressing irritation, which the patient vainly attempts to relieve by scratching off the dry scales of epidermis, or by the free use of some unctuous substance. Herpetic eruptions also produce itching, but it is seldom of long duration, and is confined to the neighborhood of the rash. And lastly, crops of small boils are apt to appear upon the outer surface of the large vaginal labia, especially about the time of the change of life; at first producing considerable itching, and smarting, and heat, with subsequently swelling and pain as the little tumors slowly suppurate.

Treatment.—The remedies which have been proposed for this neurosis of the skin of the vulva are numerous and unsatisfactory. For what is called idiopathic pruritus, the treatment must be general and local; that is to say, attention will require to be paid to the general health, while the local suffering is to be relieved. Now as regards general remedies it will often be found that mild aperients are needed; such as the sulphate of soda with sulphur (F. 148), or sulphur and magnesia (F. 153), or rhubarb and blue pill (F. 171), or if steel be unobjectionable it may be given with Glauber's salts (F. 180, 181). The assimilation of food is to be assisted by the use of pepsin (F. 420), by small doses of steel with citrate of potash (F. 403), or by the nitro-hydrochloric acid in some bitter infusion (F. 378). The diet is to consist of milk, eggs, and animal food plainly cooked; while as a rule, alcoholic drinks, tea and coffee, with all highly seasoned dishes, should be avoided. With regard to any special drugs little can be said that is favorable. Yet occasionally it has seemed to me that quinine (F. 379) has been useful, or a pill of quinine and belladonna (F. 44), or tar capsules (F. 36), or the solution of perchloride of mercury in sarsaparilla (F. 27); while sometimes small doses of arsenic (F. 52) have acted beneficially. The best local applications are those of a cooling or of an anodyne nature. An excellent cold lotion and injection can be made with half an ounce of the solution of subacetate of lead to a pint of water; or with one fluid drachm of the solution of sulphate of atropia to one pint of elder-flower water. Painting the parts, twice or thrice daily, with a mixture of equal parts of the aconite and belladonna liniments, often affords considerable relief; as does the frequent application of a lotion containing the acetate of lead and hydrocyanic acid (F. 263), or of morphia and liquor potassæ (F. 266), or of borax, and morphia, and glycerin (F. 268), or especially of a weak infusion of tobacco (F. 265). Some practitioners use almond oil, or the lime liniment, or a mixture of one part of glycerin to eight of rose-water, or the officinal calomel ointment, or a combination of equal parts of the red oxide of mercury ointment and cod-liver oil. But whatever remedy be employed, free ablution will also be necessary; which can be best practiced by daily using the ordinary hip-bath, or by employing the sitz bath two or three times a day. Whichever be adopted, the patient will derive ease from injecting plenty of the water up the vagina with a siphon syringe.

For the relief of secondary pruritus it is necessary that the cause be removed, when this is possible. The cure of an excoriated patch upon the lips of the uterus will take away the irritation; and the latter may even be thoroughly relieved by proper remedies applied to the former, before the surface heals. In such incurable affections as carcinoma of the cervix we may still succeed in checking the itching by the use of medicated pessaries, particularly of such as contain belladonna (F. 423). Supposing the patient to be gouty or rheumatic, the remedies necessary for these states are indicated; especially mild antacid aperients with colchium, and a diet in which meat is chiefly replaced by white fish. And then again, if there be eczema, lice, oxyurides in the rectum, hæmorrhoids, boils, &c., the treatment proper for these affections will have to be adopted. With regard to the treatment of the crops of boils which have already been spoken of, there are one or two useful hints to be given. One suggestion is to avoid the use of poultices unless the little tumors be actually suppurating. The formation of pus may, however, often be prevented, by just touching the apex of each elevation with a small drop of the acid solution of nitrate of mercury. I generally find that this caustic is best applied by means of a fine-pointed pipette, such as is made for taking up urinary deposits for microscopic examination; removing any surplus acid from the boil with blotting-paper.

Another important point is, that if we would prevent the formation of further crops the general health must be attended to.

2. LABIAL TUMORS.—Several varieties of tumors may be met with on or about the vaginal labia. The principal are the following:

Encysted tumors of the labia either have their origin in the connective tissue; or they may arise in one of the lobules of the vulvo-vaginal gland, the communication of which with the excretory ducts has become obstructed; or the entire gland of one or the other side may be involved, owing to obliteration of its duct. The cyst is generally developed slowly, and at first hardly attracts the patient's attention; but as the growth attains the size of a walnut there is discomfort on walking, uneasiness after sexual intercourse, sometimes irritability of the bladder, and occasionally pain. The latter is especially complained of about the time of the catamenial periods. If inflammation set in, the cyst-walls will generally secrete pus and the tumor become an encysted abscess. The cause of these tumors can seldom be made out; but I believe they may result from violence, or from the irritation set up by a want of cleanliness. The contents of the cyst will be of the nature of a glairy white-of-egg-like fluid, or of an offensive dark-colored matter, or of pus. The evacuation of the contents by a simple incision through the inner wall of the labium gives immediate relief; but generally such an operation is insufficient to effect a permanent cure. To insure this, either a portion of the cyst-wall must be excised, a proceeding, however, which is not always successful; or the interior of the cyst should be rubbed over with a stick of nitrate of silver, or with a brush dipped in the iodine liniment; or a seton can be passed through the centre of the swelling, so as to excite suppuration and obliteration of the secreting membrane; or the entire cyst may be dissected out, without puncturing it. As this latter proceeding is the most certain, so it is often by far the best plan to adopt.

Fibrous tumors are occasionally developed in one of the labia majora, or more rarely about the perineum. They may vary in size from that of a hazlenut to that of an orange. Sometimes they are found to contain cysts in their centres; which are filled either with sanguineous serum, or with a limpid watery fluid. *Fatty* tumors are also now and then met with in the same situations. The growth of both these kinds of tumor is usually slow, and is not accompanied by any marked symptoms. Not uncommonly they gradually become pedunculated; so that a tumor almost as large as a fowl's egg may be connected with one of the labia by a stalk no bigger than an ordinary quill. Frictions with ointments of mercury or iodine are quite powerless to produce the absorption of these bodies. The only remedy is excision, a very simple proceeding when the attachment is formed by a pedicle. But even where the tumor is imbedded in the tissue of the lip, there is seldom any difficulty in enucleating it with the handle of the scalpel, after making a free incision through the internal surface.

Warty growths are apt to form about the vulva, sometimes appearing in such large clusters as apparently to involve the whole of the external genitals. Usually, however, they are scattered about the labia, nymphæ, vestibule, and perineum; varying much in size and appearance, according as there are only a few little warts distributed over the tissues, or one or more large patches almost concealing the vaginal orifice. These excrescences are sometimes very vascular, so that they bleed readily; while each is found growing from a broad base, or by a pedicle which sometimes gets greatly elongated. Warty growths always give rise to a fetid discharge, with vagi-

nal leucorrhœa; and they may be due to some venereal taint, or simply to want of cleanliness. The only effectual treatment consists of removal with the scissors or bistoury, applying some styptic to control the hemorrhage. The application of escharotics without excision is seldom successful; while the pain set up by these substances continues for a very much longer time than does that produced by the use of the knife.

Hypertrophy of the labia may occur, and sometimes to an enormous extent. The skin and connective tissue of the labia majora are now and then alone affected; though more frequently the nymphæ become also involved. The enlargement usually commences on one side, but probably before advice is sought it has crept round so that both lips are attacked. In very rare instances (in this country) the hypertrophy has advanced to such a degree as to constitute a form of elephantiasis. An instance has been recorded by Kiwisch, in which a girl, seventeen years of age, had such hypertrophy of both labia, that they hung down as two large masses below the middle of the thighs. Elephantiasis of the labia is not an uncommon disease in Barbadoes. In the cases of hypertrophy which have come under my notice, the enlargement has been due to a syphilitic taint. The treatment of such cases is generally unsatisfactory. Sometimes their progress can be checked by the administration of the red iodide of mercury (F. 54) together with the use of the mercurial vapor bath (F. 131). But generally, it is necessary to remove the growths with the knife; although a permanent cure is seldom produced by this operation, inasmuch as it is difficult to make the incisions quite free from the diseased structure. Excision is always attended with considerable hemorrhage; so that not only will several vessels require the ligature, but the actual cautery may have to be applied to spots from which blood will otherwise freely ooze when reaction occurs after the operation. Where it is clear that all the disease cannot be removed by the knife, it will be better to restrict the treatment to the use of astringent lotions, and the occasional employment of scarifications to relieve the œdema.

Abscess of the labia may result from the inflammation set up by a blow, or by forcible or perhaps excessive sexual intercourse, or by a gonorrhœal or acrid leucorrhœal discharge. The part affected becomes the seat of a throbbing pain, which prevents the patient from walking or sitting without much suffering; while there is also considerable heat and swelling, sensitiveness on the least pressure, together with a variable amount of constitutional disturbance. Sometimes the inflammation commences in the vulvo-vaginal gland, the tissues of the labium becoming involved as the morbid action progresses to suppuration. With moderate caution there can be no difficulty in making the diagnosis sure. The descent of omentum or intestine into the labium, a displacement of one ovary, or an extravasation of blood, are all conditions which give rise to swelling and pain; though both these consequences are different to the tumefaction and suffering of inflammation. Patients seldom apply for relief, moreover, until there is no difficulty in diagnosing the presence of pus. The treatment consists in evacuating the pus by an incision sufficiently free to prevent its too early closure. The application of poultices, a nourishing diet, and two or three days' rest, will complete the cure. Where the practitioner is consulted before suppuration has occurred, the disease can at times be checked by rest in bed, the application of a small bladder or gutta-percha bag of ice, and attention to the general health. Aperients are only to be given, if required; while if there be any debility, ammonia and bark (F. 371), cod-liver oil, and animal food, will prove very useful.

The extravasation of blood into the connective tissue of one of the labia majora, or of the nymphæ, or of the vaginal walls, is an accident of very uncommon occurrence. It happens for the most part, just before or during or immediately after the process of parturition. The swelling which results is known as a *pudendal hæmatocele*, or a *labial thrombus*, or a *sanguineous tumor of the vulva*. The hemorrhage is the consequence of a rupture of part of that plexus of veins beneath the labia, termed by Kobelt the bulbi vestibuli. The bleeding may be very copious, even without a large rupture: fatal results are not unknown.

As far as can be remembered, I have never met with an example of pudendal hæmatocele as the consequence of disease in an unimpregnated woman; but two or three cases have fallen under my observation where this condition has happened as the result of a blow. In one of these, a young single girl fell upon the projecting corner of the upper rail of a kitchen chair, upon which she had climbed to reach the top of a wardrobe. The other patient was a married woman, but not pregnant: the hæmatocele resulted from a kick. In both instances, the pain was so great that I punctured the tumors, let out a quantity of blood, and then by rest with the pressure of pads and a T-bandage prevented any further hemorrhage. Where these tumors are left untouched they not uncommonly burst; although where the clot is not very large it may become absorbed. With regard to the treatment of this accident during labor it need only be said that delivery should be hastened; but the tumor ought not to be opened unless from its size the passage of the child be impeded. Supposing, however, the bistoury be used, the officinal strong solution of perchloride of iron will probably have to be applied to control the bleeding which is sure to ensue from the injury to the bulbs of the vestibule. If there be any varicose condition of the veins, the loss of blood may prove quite alarming, unless firm pressure be made for some time.

3. VULVITIS.—The different forms of inflammation which may attack the vulva are as follows:

Simple vulvitis is not a very uncommon affection of women who neglect to wash themselves, or who indulge in excessive sexual intercourse. It may also arise from a venereal taint, or from irritation about some adjacent organ—as the rectum or uterus. The symptoms consist of great pain and tenderness, a mucous discharge, a sense of scalding during micturition, and of a constant aching about the loins and thighs. The parts look swollen and inflamed, and they are covered with mucus; while in neglected cases they may be found more or less excoriated. A few doses of a saline aperient, rest in bed, prolonged warm hip-baths, and the use of a wash containing a little alum or subacetate of lead, will soon remove the disorder.

Under certain exceptional circumstances, inflammation of a much more intense and serious nature occurs. *Gangrene of the vulva* is connected with a depraved state of the blood; being met with amongst lying-in women who have possibly been exposed to the contagious matter of puerperal peritonitis, or of one of the continued or eruptive fevers. Now and then this disease happens amongst young women who are not pregnant; while it has especially been observed in children. The only hope for all such patients lies in the administration of wine and food, quinine and iron, and in surrounding them with pure air. Locally, the strong nitric or hydrochloric acid should be applied to the diseased patches; the patient being first placed under the influence of some anæsthetic. M. Chavanne has given

an account* of an epidemic of gangrenous vulvitis which attacked several puerperal women during January, 1850, in La Charité of Lyons. The disease commenced three or four days after delivery with vomiting and diarrhœa, or with fever and abdominal pains, or with slight hemorrhage. These symptoms were followed by prostration, anxiety, and an œdematous redness of the vulva. An active febrile stage then sets in; which, in a few of the twenty-six cases, subsided without further mischief. In the greater number, however, pultaceous plates formed about the vulva and on the walls of the vagina, adhering closely to the mucous membrane. Although this extension became arrested in a day or two, these plates were not separated by the inflammatory process until the end of the first week, or during the second; small suppurating wounds being left, which usually soon healed, though occasionally they became covered with a similar pultaceous mass. In four of the twenty-six cases, the disease extended to the uterus; a gangrenous condition of this organ, complicated with peritonitis, setting in. Three of the other patients also died from metro-peritonitis, without extension of the gangrene. The remaining nineteen recovered; the gangrene yielding to tonic regimen, and the local use of the strong hydrochloric acid. No cause could be assigned for the outbreak of this epidemic; which seemed to resemble one that had occurred a short time previously in Paris, as well as one which was observed at Lyons in 1815.

Inflammation of the vulvo-vaginal glands is not of very rare occurrence. These conglomerate glands, the analogues of Cowper's glands in the male, are placed one on each side of the vaginal orifice. They are apt to become inflamed from their secretions being retained in consequence of the excretory ducts getting blocked up. The symptoms consist of heat and pain; while on examination a painful swelling is found, perhaps the size of a large almond, by the side of the mouth of the vagina. Unless resolution occurs, the morbid action will end in suppuration; and then the case must be treated as if it were a common abscess. In simple enlargement and induration of this gland, from long-continued irritation, extirpation may possibly be needed.

Follicular inflammation of the vulva is an obstinate and painful disease, which has been well described by Dr. Oldham.† The morbid action has its seat in the numerous sebaceous follicles and other minute solitary glands scattered over the mucous membrane of the vulva; and it generally affects both sides of the vaginal entrance, with the tissues within the nymphæ and at the base of the clitoris. According to M. Huguier, the sebaceous matter sometimes accumulates in these follicles, without inducing inflammation; a condition resulting analogous to that observed in acne of the face. On making an examination in a case of follicular vulvitis, the parts are found more or less generally inflamed; while they are seen to be studded with a number of raised vascular points, sometimes having specks of ulceration on their summits. After a time the points coalesce, so that a strip of highly injected mucous membrane is formed; while at a later period this vascularity disappears, and the tissues look as if they were covered with white paint. There is constriction of the sphincter vaginæ; leucorrhœa is troublesome, with irritation of the genitals and smarting; sexual intercourse becomes so painful that it has to be avoided; and there are pains in

* Gazette Médicale de Paris for 1852. Quoted from the Association Medical Journal, p. 216. March 11th, 1853.

† London Medical Gazette. New Series, vol. ii, p. 845. May 15th, 1846.

the back and thighs. The heat and irritation about the vulva, the sense of burning during micturition, and the somewhat offensive nature of the secretions, may all prove very troublesome. The disease causes considerable disturbance of the general health, with loss of appetite and mental depression. It is sometimes complicated with prurigo. This disorder may occur at any time after puberty; though perhaps it is most common during pregnancy, as well as about the time of the cessation of the catamenia.

Follicular vulvitis is of a very intractable nature, and is not easy to treat. The application of astringents always proves injurious; inasmuch as these agents produce very great pain at the time they are used, while they set up an increased tenderness of the parts which may last for many weeks. The best local remedies are those which exert a soothing influence; and no lotions are therefore more valuable than such as contain morphia and hydrocyanic acid (F. 266), or tobacco (F. 265), or glycerin and lime-water (F. 286). If ointments be preferred, one of iodide of lead and belladonna (F. 293), or of aconitine and calomel (F. 296), or of hydrocyanic acid and atropia (F. 306), may be prescribed. A warm hip-bath, containing some extract of poppies and soda, will afford considerable relief; it should be employed night and morning, for fifteen or twenty minutes each time. The general health must be looked to. The diet ought to be plain, nourishing, and free from seasoned dishes. Tea, coffee, wine, and beer, are to be forbidden; a little brandy in soda-water being allowed where a stimulant is required, though this may often be dispensed with if the patient can take plenty of milk. Small doses of arsenic with bark (F. 52) have sometimes seemed efficacious; so has some bitter tincture with the mineral acids (F. 378); and so has quinine with aconite (F. 379). In very chronic cases, a cure will now and then be effected by corrosive sublimate and sarsaparilla (F. 27), cod-liver oil, and change of air.

The external surfaces of the labia majora sometimes become the seat of *erythema*, generally in consequence of a neglect of cleanliness. The eruption is of a bright red color, and gives rise to a sensation of heat and discomfort; while it soon spreads along the integuments to the upper and inner surfaces of the thighs. This disease is most common in stout middle-aged women; and, unless they abandon their dirty habits, the moisture which is exhaled from the almost raw surface becomes very offensive. Indeed, if the discharge be allowed to irritate the parts for any length of time, *erysipelas* will possibly set in; a disease which may also attack the vulva from other causes, and which requires the same treatment as when it affects other tissues. In erythema, a cure can generally be brought about by removing any disordered state of the health, by ordering an unstimulating diet, and by having the affected parts well bathed every few hours with the dilute solution of subacetate of lead. Women are fond of applying Fuller's earth (consisting of silica, alumina, oxide of iron, magnesia, and water, with traces of lime and chloride of sodium and potash) to the irritable surface; and as this substance is astringent, it can do no harm, provided the parts are also often washed. The remedies for *prurigo*, *lichen*, *eczema*, and *acne* of the vulva, are the same as for these diseases affecting other structures.

Children of all ages are liable to become affected with a discharge from the mucous glands of the vulva, constituting *infantile leucorrhœa*. Occasionally the disease spreads up the vaginal canal; giving rise to a profuse purulent or muco-purulent fetid secretion with heat and pain during micturition, and slight excoriation of the surrounding parts. The practitioner must be on his guard lest he compromise some innocent individual by attrib-

uting the discharge to gonorrhœal infection, or to violence in attempting a rape. A few years ago I saw, in consultation with Dr. S. C. Reed and Mr. Brooks of Fleet Street, a strumous little girl, seven or eight years of age, with an abundant leucorrhœal discharge. There were no marks of contusion or violence about the pudenda, and the symptoms seemed clearly due to natural causes. The parents, however, had made up their minds that a young man who lodged in the same house had been trying to have intercourse with the girl; and I believe they had given him into custody on this supposition, and were to proceed to the police court from my house. It required considerable persuasion to make the parents understand that there were no grounds whatever for their suspicions. Dr. Taylor* has collected the histories of several cases where men have narrowly escaped conviction for crimes which were never committed. This gentleman shows that a purulent discharge with aphthous ulceration may take place as a result of vaginitis; the inflammation occurring in scrofulous children, or in others as the result of dentition, intestinal worms, a want of cleanliness, &c. Children thus affected have been taught to extort money by making imputations against innocent persons, or the parents have now and then unwittingly led a mischievous girl to make such a charge, by first threatening and then suggesting their own convictions to her. With regard to those fatal sloughing or gangrenous ulcerations of the vulva described by Mr. Kinder Wood,† I can say nothing from my own experience. They must be very rare in this metropolis; for with all the opportunities formerly afforded by a large hospital and dispensary practice, I have never met with one example. No medical man, however, should venture to give evidence at a trial for rape upon a child, without making himself acquainted with Mr. Wood's paper; for the prisoner's counsel will very properly have "got up" all its details, and he may soon make the practitioner look rather foolish.

The symptoms of infantile leucorrhœa consist of itching and of tenderness, as well as of frequent micturition, with ofttimes pain on passing water. There is a mucous discharge, which becomes more copious and acrid the longer it is allowed to continue. Not uncommonly the parts about the vulva have an erythematous blush. The irritation produced by this eruption, as well as by the discharge, causes the child to frequently rub or scratch herself; and thus troublesome excoriations are produced and kept up. In rare cases an ulcer may be found just within the vagina. The general health is depressed, the nights are restless, and often some of the cervical glands are swollen, or there are other marks of the strumous constitution. The child is either badly fed, or does not properly assimilate its food. In that form of inflammation which is described as *diphtheritic vulvitis*, tough false membranes are formed upon the inner surface of the labia, such membranes being reproduced after forcible removal. These exudations resemble those thrown out about the fauces in true diphtheria. The effects of the diphtheritic poison are very rarely, if ever, confined to the vulva in these cases. Somewhat analogous to them are those instances of scarlatinal vaginitis which have been already referred to (p. 249).

The treatment of infantile leucorrhœa must be perseveringly carried out, or the disease will last for many weeks. Attention to cleanliness, frequent sponging or syringing with an astringent lotion, the use of tepid hip-baths containing a little alum, and the occasional exhibition of mild alteratives

* Medical Jurisprudence. Seventh edition, p. 692, *et seq.* London, 1861. Dr. Guy (Principles of Forensic Medicine, Second edition, p. 38, London, 1861) also shows very clearly how appearances on the parts of generation, resembling those due to violence, may be caused by disease.

† Medico-Chirurgical Transactions, vol. vii, p. 84. London, 1816.

or laxatives, will be needed. Where there is much tenderness the parts ought to be fomented with a decoction of poppies for two or three days before using the astringent applications. The diet should be plain but nourishing, with plenty of milk, and tonics (especially quinine and steel) will always be useful. Cod-liver oil is often very serviceable. If the discharge proves obstinate a short residence at the seaside, with sea bathing, will generally cure it.

4. RODENT ULCER.—This remarkable disease (often described under the name of *Corroding ulcer*) consists of an intractable ulceration, which commences on some part of the external genitals and gradually creeps over the vulvo-anal region, the surrounding structures having a tendency to become hypertrophied. As the ulcer heals in one direction it extends in another, while the process of repair seems to be accompanied by the formation of a firm burn-like cicatrix, which has a great tendency to cause contraction of the vaginal or anal orifice. At the onset, as well as for some weeks afterwards, the suffering may be remarkably slight, so that until the orifice of the vagina becomes fissured by the disease, or the mouth of the urethra gets involved, there is no pain during sexual intercourse or micturition. For a long time the general health does not appear to be affected, menstruation occurs regularly, and there is no loss either of strength or of flesh; but unless a cure be effected the profuse discharge at length proves very weakening, the appetite ultimately fails, there is dyspepsia, attacks of colliquative diarrhœa set in, and sometimes there is hemorrhage. The patient may die either from peritonitis, or from erysipelas, or from stricture of the rectum, or from fatal exhaustion. Death, however, seldom takes place until after the lapse of some eight or ten years from the commencement of the disease.

This affection has been particularly described by M. Huguier in his *Mémoire sur l'Esthiomène, ou Dartre Rongeante de la Région vulvo-anale*,* in which he draws a parallel between the eruptions of the face and those of the vulvo-anal region. The ulceration occurs for the most part in women between the ages of 20 and 50, who are either married or have led irregular lives. Nothing positive is known as to its cause, though it has seemed to depend upon some strumous condition of the system, or upon a degenerated syphilitic virus affecting the fluids. M. Huguier treats of the disease as it occurs in three stages: (1) The *superficial, creeping* or *serpiginous* form, of which there are two varieties, the *erythematous* and the *tubercular esthiomenos* ['*Εσθίω* = to corrode or eat away]. (2.) The *perforating*, which slowly and steadily advances until the ulceration produces the most frightful ravages. And (3) the *hypertrophic*, in which, as one portion of the affected tissue is being destroyed another part is undergoing abnormal development. Of this kind there are also two varieties: the *vegetating hypertrophic*, where small vegetations or excrescences appear upon the ulcerated surface or on the surrounding indurated integument. The other form of hypertrophic esthiomenos is the *œdematous* or *élephantiasic* kind, in which inflammation of the lymphatics, with venous obstruction, leads to excessive infiltration and induration of the tissues, large masses being produced that obstruct the vaginal and anal outlets at the same time that they give rise to the most repulsive disfigurement.

The general treatment of vulvar corroding ulcer or esthiomenos is the same as that required in rodent ulcer of the face; though there is more

* Mémoires de l'Académie Nationale de Médecine, tome xiv, pp. 501–596. Paris, 1849.

difficulty in effecting a cure, because of the irritation which is kept up by the acrid discharges. Good diet, cod-liver oil, rest, daily hip-baths, and anodyne lotions, are to be employed perseveringly, while sometimes benefit may be expected from the administration of iodide of potassium (F. 31), the green or the red iodide of mercury (F. 53, 54), or from Donovan's triple solution (F. 51). The efficacy of potential caustics is very doubtful. But where the disease is limited, so that the whole of it can be removed, excision should be practiced; the operator taking care to extirpate every tubercular excrescence, however insignificant-looking, which may be present. As the parts heal, tents or bougies must repeatedly be employed to prevent undue contraction of the vaginal and anal openings.

5. VULVAL CANCER.—Any portion of the external genitals or of the vaginal walls is apt to become the seat of malignant disease. This may occur primarily, or it is often secondary, *i. e.*, the cancerous infiltration extends to the vulva from the uterus, rectum, &c. Epithelial cancer of the external genital organs is more common than any other variety, but occasionally the affection is of the scirrhous or of the medullary form. The latter, however, is very rare, only one example having fallen under my observation. In this case, a married lady, 59 years of age, the mother of six children, suffered from medullary cancer confined to the vagina and external labia, and, when I saw her in July, 1861, in consultation with Dr. Ellison, of Windsor, she was dying from exhaustion, the disease having only existed for fourteen months.

The diagnosis of cancer of the vagina is easily made. I have, however, seen a case of large vesico-vaginal fistula, the result of a lingering labor, mistaken for malignant disease. The symptoms of both conditions have some points in common,—great suffering, swelling of vaginal labia, constant escape of urine, and extensive excoriations producing great tenderness. On the other hand, vaginal cancer proves fatal within two years from its commencement, whereas a fistula embitters life without shortening it. In the case just alluded to, thirty-seven years have elapsed since the whole floor of the bladder sloughed away, after (as I am told) a labor lasting for nearly a week. The patient is still able to work for her living, though she suffers much from excoriations, &c.

Epithelial cancer is more amenable to treatment than the other kinds. Where the disease is confined to the external labia considerable relief may be given by excision, provided care be taken to remove every trace of unhealthy tissue. By such an operation a patient may have one or two or even more years of comparative health and happiness granted to her, though in the end the affection will return and ultimately destroy life. In those cases where surgical interference is out of the question, attempts must be made to give relief according to the principles already inculcated (p. 119). The disease often quickly extends in all directions, in spite of remedies, the integuments over the pubes, or in one or both groins, becoming the seat of ragged excavated ulcerations. Frequently, too, the patient's sufferings are considerably increased by the destruction of the recto-vaginal septum, or by the perforation of the walls of the bladder; or we may have to draw off the contents of the bladder every few hours, owing to the almost complete obliteration of the orifice of the urethra. The difficulty of passing the catheter is often so great in these cases, and the pain is so intense, that it is necessary to put the poor woman under the influence of ether or chloroform before using the instrument.

6. ENLARGEMENT OF THE CLITORIS.—Excessive development of the clitoris will occasionally exist as a congenital malformation, although it seldom does so, save in connection with some arrest of development about the uterus, vagina, or labia. This organ may also acquire an abnormal size in after-life, either owing to simple hypertrophy of its tissues, or to its becoming the seat of an innocent or malignant deposit, or to its giving origin to some cystic formation.

A very remarkable case in which the clitoris was converted into a cyst, has been recorded by Dr. Meigs.* The tumor commenced after a blow, and in fourteen years acquired the size of an infant's head, to judge from the sketch which is given. It was punctured, about twenty-two ounces of black blood, of the consistence of tar, being evacuated. Four months afterwards the fluid was again collecting. The history of a case of enormous enlargement of the clitoris and nymphæ, has been published by Dr. McClintock.† When the patient was admitted into the Dublin Lying-in Hospital, in the seventh month of her second pregnancy, the nymphæ hung down in the form of tuberculated tumors, with the clitoris between them as large as a turkey's egg. Nine years previously she had suffered from syphilis, but the enlargement had only commenced two years prior to her admission into the hospital. The clitoris was amputated by the ligature, as it was feared that it might interfere with parturition. Some weeks after her labor, the nymphæ were likewise removed by ligatures and the scalpel. In another instance, related by the same physician, a single lady, 20 years of age, suffered from enlargement of the nymphæ, while the prepuce of the clitoris had become the size of a Spanish chestnut. Local and general treatment proving useless, the diseased parts were successfully amputated with the écraseur. The clitoris may be injured by violence. The particulars of an instance in which this organ was ruptured by a kick, have been given by Mr. Gutteridge.‡ On inspecting the vulva a wound was seen just within the vagina on the left side, the injury extending from the pubes along the ramus of this bone, to the extent of an inch, and having a depth of about three-quarters of an inch. The left crus clitoridis was crushed throughout its length, so as to show its cavernous structure. From this part hemorrhage had ensued, which proved fatal in about an hour from the receipt of the injury.

Hypertrophy of the clitoris has been thought by some surgeons to be due to the practice of improper excitement of this organ. The probability is, however, that this explanation is incorrect. At all events, out of 6000 prostitutes examined by Parent Duchatelet, the clitoris was found to be natural in size and appearance in all but three; and none of these three women were remarkable for the strength of their passions. The clitoris is sometimes found indurated with only slight, if any, enlargement. Mr. Baker Brown considers that this condition is due to self-abuse; and when the latter is affecting the general health, and the patient is unable to give up the degrading practice, he has recommended that the clitoris should be excised. I think I am right in saying that Mr. Brown believes he has cured many serious diseases of the nervous system, originating in improper excitation of the sexual organs, by this operation. But even if we allow that some cases of paralysis, epilepsy, insanity, and hysteria are caused by the injurious physical and moral effects which result from masturbation, it

* A Treatise on the Diseases and Special Hygiene of Females. By Colombat de l'Isère. Translated from the French by Charles D. Meigs, M.D, &c., p. 85. Philadelphia, 1850.

† Clinical Memoirs of Diseases of Women, p. 224. Dublin, 1868.

‡ The Lancet, p. 478. London, October 31st, 1846.

does not follow that clitoridectomy will effect a cure. My own opinion, as has been elsewhere shown,* is that very little benefit can result from this proceeding; and it is, therefore, satisfactory to learn that in deference to the views of the profession, Mr. Baker Brown has ceased to recommend the operation.

When, in consequence of hypertrophy or cystic disease, amputation of the clitoris becomes called for, it will be found better, as a rule, to use the knife or scissors in preference to the ligature. The patient ought to be placed in the same position as for lithotomy, after anæsthesia has been induced; and the organ being drawn well forward with a pair of hooked forceps, it should be excised by cutting through the crura on each side. The free hemorrhage which results is easily checked by the use of pads of lint and a T-bandage, so applied as to exert sufficient pressure upon the symphysis pubis. An opiate will be needed to dull the pain. The catheter will afterwards be required for two or three days, and the patient must remain in bed until cicatrization is complete.

7. COCCYODYNIA.—The coccyx is formed of four small segments of bone, which may be regarded as rudimentary vertebræ. None of the segments have any spinal canal or intervertebral foramina. The first and largest division of the coccyx articulates with the lowest sacral vertebra; the last three coccygeal segments are usually anchylosed into a single bone.

The coccyx, or the tendinous expansions of the muscles and the fibrous tissue of the ligaments, will now and then be found the seat of severe pain of a neuralgic character; this affection being technically knows as *coccyalgia*, or *coccygodynia*, or *coccyodynia* [from *Κόκκυξ* = the cuckoo—because the coccyx is said to resemble the beak of this bird—and *ὀδυνη* = pain].

The *causes* of coccyodynia are usually blows, falls (especially tumbles down three or four stairs, when the bottom of the back strikes the edge of each stair), bruises produced by violent or prolonged horse-exercise, injuries inflicted during parturition, and so on. Moreover, whatever is capable of exciting inflammation in the muscular attachments to, and the fibrous tissues around the coccyx, may lead to this disease. Hence, we find it attributed to sitting on damp grass or cold stones, to the application of ice which has been used for checking uterine hemorrhage, as well as to mischief set up by unnecessarily severe operations about the rectum.

The *symptoms* are characteristic. They consist chiefly of great pain on sitting down or on rising from a chair; as well as on walking, and on defecation, &c. Indeed, whatever stretches the exceedingly tender structures attached to the coccyx, proves to be the source of considerable suffering. Many of the patients can only sit on one hip. They get from the sitting to the erect posture in a slow and deliberate manner; so as to avoid any strain on the coccygeal ligaments, and to prevent any play of the sacro-coccygeal articulation.

The tenderness on pressure is usually well-marked; while sometimes the slightest touch of the tip of the bone causes agony. The tenderness is also aggravated by sexual intercourse, and frequently by the menstrual flow. Occasionally, coccyodynia is accompanied by some chronic uterine or ovarian disease. Frequently the general health is depressed; while there is also no little anxiety, especially where advice has been had without any relief following.

The *treatment* ought to be prompt. It is merely a waste of time to try

* Transactions of the Obstetrical Society of London, vol. viii, p. 360. London, 1867.

the effect of warm baths, sedative applications, opiate plasters, iodine liniments, or small blisters over the seat of pain. India-rubber cushions, to keep off pressure, are useless. Leeches do harm. Even the subcutaneous injection of morphia, or of atropin, will only give temporary relief. The only hope of effecting a radical cure is by operation.

Now the most simple proceeding, but, unfortunately, the least certain, consists in the subcutaneous division of the muscular fibres and ligaments and fasciæ connected with the coccyx, so as to set the bone at rest. The operation, as suggested by Sir James Simpson, is performed with a tenotomy knife, which must be strong enough to bear manipulation without breaking. The blade of this introduced through the skin over the middle of the bone, is to be deliberately passed all round, and close to its surface and edges, as well as over its tip. The disengagement of the coccyx from the surrounding soft textures thus effected, is usually at once attended with complete relief to the pain. But this apparent cure does not always prove real. Either because the tissues again become adherent to the bone, or in consequence of there being some mischief in the osseous structure itself, the pain returns. Under such circumstances the only plan is to amputate the whole, or simply the last two segments of the bone itself.

The coccyx was first extirpated for the relief of neuralgia by Dr. I. C. Nott, of Mobile, Alabama.* Subsequently, in June, 1859, this operation was had recourse to by Sir James Y. Simpson, after he had failed to effect a cure by the subcutaneous division of the muscles and tendons and ligaments attached to the coccyx.† Following in the steps of these gentlemen, I have removed the coccyx in a few instances with complete success. The operation is in no way difficult; it being merely necessary to make an incision about two inches long over the bone, and then having fairly exposed this structure to sever the soft attachments all round it, dividing it between its segments with the bone pliers. One or two vessels may need a ligature; and then the edges of the wound are to be brought together by a couple of sutures. With rest and water-dressing, union will be found complete in a few days. The relief which is thus afforded is sometimes surprising. The general health improves, and all mental anxiety ceases as the feeling is experienced that a most troublesome source of suffering has been removed.

In close proximity to the tip of the coccyx, and attached to it by a fine pedicle, is a minute body which has been the subject of some discussion. It is found as a roundish body about the size of a small shot, or as four or five or more isolated corpuscles connected by fine vessels. This body, discovered by Professor Luschka, of Tübingen, has been regarded by different observers as a gland; as a kind of heart, to strengthen the circulation in the superjacent skin; as the vestige of an organ, only of use during fœtal life; and as the homologue of some structure in the lower animals. This last theory is held by Dr. W. M. Banks, after a thorough investigation of the subject, to be the only rational explanation; while this gentleman believes with Julius Arnold that the body is a vascular appendage of the middle sacral artery, and not a gland as supposed by Luschka. Dr. Banks says‡ that this coccygeal body hangs from the very end of the middle sacral artery, and is formed by the union into a glomerulus of from two to six

* Quoted from the "New Orleans Medical Journal," May, 1844, by the American Journal of the Medical Sciences, New Series, vol. viii, p. 544. Philadelphia, 1844.

† The Medical Times and Gazette, p. 1. London, July 2d, 1859.

‡ The Glasgow Medical Journal, p. 14. New Series, No. 13. May, 1867.

clumps of arterial twigs, with saccular dilatations upon them; the whole being bound into one mass by a sort of capsule of connective tissue, which sends in processes between them. The body has no physiological functions; and nothing is known with regard to its pathology. Perhaps, however, it may act as a starting-point for those cysto-sarcomatous tumors now and then found in the perineum. There is probably no connection between this arterial appendage and coccyodynia; notwithstanding Luschka's opinion, that this affection consisted essentially of an inflammation of the little coccygeal body.

There are other congenital coccygeal tumors occasionally met with, which on dissection have been found to contain rudimentary bones and muscles and teeth. Such growths have sometimes been formed by the inclusion of one fœtus within another: that is to say, two ovules having been impregnated, after a time the development of one has become arrested. Either before or just as this has happened, however, the blighted fœtus has become attached to the healthy body; and thus has got included in its structure.*

II. DISEASES OF THE URETHRA.

Diseases of the female urethra are neither very common nor severe. The simple nature of this canal as compared with that of the male, accounts for the great difference which exists between the morbid states of this part in the two sexes; while inasmuch as it is only an inch and a half in length, remedial measures are of easy application. The meatus urinarius, placed just above the orifice of the vagina, is at times found very much dilated, or contracted, or displaced, or simply or specifically inflamed. In a few remarkable instances of vaginal malformation the orifice of the urethra has become so dilated, that sexual intercourse has been effected through it. Strange to say, such a proceeding has not led to incontinence of urine.

1. URETHRAL TUMORS.—The meatus urinarius is not uncommonly the seat of a *vascular tumor*. There may be only a single growth, or two or three: generally they are attached by broad bases, but sometimes they are found pedicellated. Although the external orifice of the urethra is their most frequent seat, yet they may grow from any portion of this canal. In some rare instances, similar growths have been found at the orifice of the male urethra.

Each excrescence consists of several hypertrophied papillæ, invested by a thick layer of tessellated epithelium; and while the growth is certainly very vascular, it is also probable that it is freely supplied with nerves. In the cases which have come under my notice, the tumor has varied in size from a florid elevation the size of a pin's head, to a growth as large as a date-stone; but instances have been recorded where the tumor has equalled a pigeon's egg in its measurements. Moreover, as far as my experience goes I should say that the larger the tumor, the less severe is the suffering occasioned by it. In examining women rather far advanced in life, the

* Compare with the author's Signs and Diseases of Pregnancy. Second edition, p. 170. London, 1867.

subjects of uterine disease, I have on several occasions found these tumors as large as peas, while no sense even of discomfort has been experienced.

Generally speaking the symptoms resemble those produced by a stone in the bladder. Thus, there is irritability of the bladder, a sanious or slight muco-purulent discharge, great pain on passing urine, and tenderness on pressing the urethra. Sexual intercourse aggravates the suffering, and ofttimes cannot be borne at all. In one woman under my care, the bladder was so irritable that there was not merely frequent micturition, but complete incontinence of urine. Now and then there is pain down the inside of the thigh; while I have known severe pain in the heel result from one of these urethral growths. As these tumors are liable to bleed at times, a little blood often comes away with the urine; so that until an examination of the parts be made, the practitioner may be led to imagine that there is either a cancerous substance or a small calculus in the bladder.

These tumors are readily removed, but it is not as easy to prevent their return. The treatment which I have found answer the best consists in excising them with a pair of sharp-pointed scissors, and in then applying the actual cautery so as to destroy the submucous base. An excellent instrument for this purpose may be made by fixing a piece of thick bell-wire into part of the stem of a common clay pipe; the flame of a spirit-lamp being sufficient to heat it. The cautery, moreover, not only destroys the base of the growth, but stops the hemorrhage which follows simple excision. The use of the acid solution of nitrate of mercury, or of potassa fusa, is not as effectual in the latter respect, nor can the action of these caustics be readily limited to the desired spot. Following the advice of some authorities, I at one time employed the ligature; but it has seemed to me to be a clumsy and slow method of doing that which can be accomplished with less pain by the scissors in a few seconds. Whatever plan be adopted, however, the practitioner should take care to get a good view of the growth and its exact attachment before touching it; which view may be best obtained by an assistant separating the lips of the urethra rather widely with a couple of bent probes, while the patient is in the ordinary position for lithotomy.

In some very rare instances, a tumor has been found at the orifice of the urethra consisting of the *inverted bladder*. Dr. John Green Crosse, of Norwich, met with an example of this in 1829: A healthy girl, between two and three years of age, had a tumor about the size of a walnut, projecting between the external labia. It was of a florid red color, resembling a large strawberry; and the surgeon who consulted Dr. Crosse about its nature, believed it was a vascular tumor, which might be removed by ligature. Indeed, a few days afterwards a ligature was just about to be applied, when Dr. Crosse accidentally went to the patient's bedside; but fortunately this gentleman begged for a few minutes' grace while he gently pressed the swelling, as if to reduce a hernia, and found that the whole disappeared through the urethra. This canal was so dilated that Dr. Crosse was then able to fairly introduce his finger into the cavity of the replaced viscus. Had a ligature been applied, "the bladder would have been removed, including all its coverings, the ureters cut through just above their terminal orifices, and the peritoneal cavity largely opened." For sixteen years after the replacement there had been no relapse, but the patient was troubled with incontinence of urine.* A similar case was under the observation of Dr. Murphy: Jane R., ætat. 4, was admitted into the Meath Infirmary,

* Transactions of the Provincial Medical and Surgical Association, vol. xiv, p. 185. London, 1846

July 9th, 1829. A pyriform tumor, about the size of a small hen's egg, and the color of dark mahogany, was seen between the labia. It had been mistaken for prolapsus ani by the gentleman who first made an examination. On drawing the tumor downwards, the orifices of the ureters were seen, and a small silver probe was passed up each. The bladder was easily replaced, and after a few inflammatory symptoms had subsided, she was discharged cured.* A third instance, in which the inversion was congenital, has been reported by Dr. Lowe, of the West Norfolk and Lynn Hospital. The patient was two years and a half old, and the bladder was seen between the labia like a vascular tumor, the size of a large Italian walnut. After replacement, a natural condition of the urethra was induced by the application of the actual cautery on five separate occasions.† And lastly, a fourth case has been published by Dr. Beatty, in which the child was nearly two years old, and had suffered from the inversion for eleven months. There was also prolapsus of the rectum. The bladder was easily pushed back through the urethra; but while under treatment the girl died of croup.‡ The foregoing constitute all the reported cases of inversion of the bladder through the urethra, with which I am acquainted, so far as the literature of this country is concerned. Examples of inversion of this viscus through vesico-vaginal fistulæ are more frequently met with; but such cases have nothing in common with those which have now been considered.

2. URETHRITIS.—Acute or chronic inflammation of the urethra may occur independently of gonorrhœa, or of inflammation set up by irritating uterine discharges.

The *symptoms* consist chiefly of a feeling of heat along the urethra, great pain on passing water, a muco-purulent discharge, and irritability of the bladder. The urine may be found loaded with urates or with uric acid, or it may be albuminous or bloody, or it may contain pus or ropy mucus. On examination, the lips of the meatus can be seen to be morbidly vascular and swollen; while sometimes the mucous lining is everted and highly sensitive. The canal of the urethra will be felt indurated, like a cord, beneath the symphysis pubis; while it is tender on pressure. The inflammation will possibly cause retention of urine from spasmodic stricture; which, however, should be relieved by a hot hip-bath, rather than by the use of the catheter, as the passage of this instrument causes most acute pain. There is usually considerable constitutional disturbance, with nervous irritability.

Simple *treatment* commonly suffices to remove this disease. Hot hip-baths, fomentations, rest in bed, an unstimulating diet, and a free supply of demulcent drinks, are the principal remedies. Opium in combination with belladonna (F. 344) may also be given; or a pessary of belladonna and bismuth (F. 423) introduced nightly into the vagina, will give great relief. In chronic cases, a cure can often be effected by passing the solid nitrate of silver into the canal for a few seconds; or this failing, a capsule of balsam of copaiba will possibly be advantageously administered by the mouth three or four times a day.

3. URETHRAL STRICTURE.—Stricture of the urethra is not a frequent affection in women. Two well-marked instances have come under my care; and, as they illustrate the symptoms and treatment of organic contraction of this canal, a short notice of them may be useful. The

* London Medical Gazette, p. 525. January 19th, 1833.
† The Lancet, p. 250. London, March 8th, 1862.
‡ Dublin Quarterly Journal of Medical Science, vol. xxxiv, p. 189. 1862.

first example met with was the following: Mrs. S., thirty-six years of age, applied to me in May, 1859. Has never been pregnant; the catamenia are regular, but very abundant; and the general health is bad. Has suffered from stricture of the urethra for some years, with occasional attacks of retention of urine. She has to pass water very frequently, being obliged to rise five or six times every night to do so. Was under the care of Mr. Travers until his death: this gentleman attempted to effect a cure by the use of caustic. On examination by the vagina, I found the urethra hard like a cord, but not oversensitive on pressure. A number one male catheter was introduced into the bladder with great difficulty: the stricture seemed quite cartilaginous. Day by day, however, a larger instrument was passed, until a number twelve entered easily. The menorrhagia was due to a large fibrous tumor in the cavity of the uterus; which tumor was subsequently removed, after dilating the os uteri. This patient has seen me occasionally up to the present time (March, 1869). There has been no return of the stricture, or of the irritability of the bladder; but she still passes a large-sized gum-elastic catheter about every fortnight, and finds some slight difficulty in doing so, if the use of the instrument be omitted for three or four weeks. The second patient, sent to me by the previous one in May, 1860, gave this account of her sufferings: "I have suffered from stricture of the urethra for three years, and have had advice without any relief. The two surgeons I have consulted believe that there is some tumor in the bladder, as well as a stricture of the water passage. I have to pass my water almost constantly, unless it dribbles away, as it often does. I always take the bed-pan into bed with me at night, and generally sleep on my back with the pan underneath me." There was much difficulty in introducing the smallest silver catheter; but by perseverance it was made to enter the bladder, and was then retained in the urethra for some hours. In a few days, a large-sized instrument entered easily; and soon a number twelve could be used. She was directed to pass an elastic catheter every week. On the 17th October, 1861, I heard that there had been no relapse. The cure was complete; the mischief being all in the urethra, without any vesical tumor.

With a hint or two on *female catheterism*, the subject of urethral stricture may be dismissed. Where the practitioner is only occasionally called upon to introduce the catheter, he finds that this proceeding is not so easily accomplished as many authors assert. The simplest plan is to make the patient lie upon her back, with the thighs separated and slightly drawn up; taking care that there is no exposure. The surgeon should then separate the labia and introduce the second finger of his right hand into the vagina, with the palmar surface upwards; along which, as on a director, he slips the instrument held lightly in the left hand. Thus, the catheter cannot enter the vagina, while it will almost certainly slip into the orifice of the meatus urinarius. It should be remembered that in elderly women who have had children, as well as in pregnant females, the meatus is often drawn into the vagina somewhat under the symphysis pubis.

4. CANCER OF THE URETHRA.—A cancerous tumor has been met with at the orifice of the female urethra as a primary growth—*i. e.*, independently of the extension of adjacent malignant disease. According to some authorities, a simple vascular tumor may acquire a carcinomatous nature; but I have never met with an instance corroborative of this opinion.

Two cases have occurred in my practice of cancerous infiltration of the walls of the urethra, but such instances are very uncommon. In one of

these the opening of the vagina became narrowed, appearing to be drawn up by the contraction of the diseased mass on the under surface of the urethra; though the walls of the vagina were never involved in the infiltration. Between the commencement of the symptoms until death fifteen months elapsed. With the second case, which I visited in consultation with Mr. Marsh, of St. John Street, Clerkenwell, the disease gradually spread along the urethra to the floor of the bladder. The suffering in urethral cancer is very severe; being at first aggravated by repeated attacks of retention of urine, and at a later stage (when ulceration has set in) by inability to retain a drop of the renal secretion. I hardly know which state is the most distressing—the pain of passing a catheter through the tight and tender stricture being a frequent source of misery, while the discomfort and stench and excoriations produced by the constant escape of the urine become almost unbearable.

The treatment of cancer in this situation must be conducted on the principles which have already been laid down in speaking of the disease generally.

III. STONE IN THE BLADDER.

In whatever way the fact may be accounted for, it is certain that stone in the bladder is a very rare disease in women. This is well shown in a paper by Mr. Smith, surgeon to the Bristol Infirmary, from which essay we learn that out of 354 cases of vesical calculus, operated upon in that institution during the previous 83 years, there were only 7 females, and all of these were under 35 years of age.* Mr. Coulson also remarks that out of 2238 patients 111 were females, making a proportion of 1 female to 20 males; while by the estimate of Dr. Prout, the numbers are as 1 to 23.† According to some authorities, the comparative exemption of women from this disease is principally due to the facility with which calculi can spontaneously pass through the short and dilatable urethra. But this explanation is probably more specious than true, for numerous inquiries amongst gentlemen of experience have led me to believe that renal calculi are much more commonly found in male than female subjects, and certainly cases of calculous nephralgia are very seldom met with in the latter.

The *symptoms* of stone in the female bladder resemble those presented in the other sex, with this exception, that the suffering is commonly more intense. There is pain in the urethra, back, and upper part of the thighs, generally increased by sexual intercourse and by walking; a sense of forcing down, like that which occurs in labor, is experienced; there is often vaginal cystocele, procidentia uteri, and sometimes prolapsus ani; while there is either incontinence of urine or very frequent calls to micturate. In one instance where I removed a phosphatic calculus nearly two inches long, one inch and a quarter broad, and 331 grains in weight, the patient had experienced the greatest pain in passing water; and yet she had been obliged to strain and void each drop of urine about every twenty minutes through the night and day. Moreover, in these cases, immediately after micturition, the patient feels that she has not emptied her bladder, while

* Medico-Chirurgical Transactions, vol. xi, p. 1. London, 1821.

† The Diseases of the Bladder and Prostate Gland. Fifth edition, p. 405. London, 1857.

she soon learns that by further attempting to do so her sufferings are greatly aggravated. The urine generally contains a quantity of ropy mucus; it may be loaded with urates, phosphates, or oxalic acid; while it is frequently bloody, and occasionally so to a marked degree. To examine the bladder, the patient should lie on her back with the knees drawn up, and then there will be no difficulty in detecting the stone with the sound or silver catheter. Often too, the calculus can be felt though the vesico-vaginal septum; and it is said that ballottement may be obtained, which might be mistaken for the motion imparted to a fœtus by the finger. The nature of the various forms of renal calculi having been already noticed (p. 708), it is only necessary to say that these concretions in women often have very extraordinary nuclei. Young girls occasionally introduce foreign bodies—such as hair-pins, short sticks of pencil, pieces of quill, fruit-stones, ear-picks, &c., into the bladder; and these, if allowed to remain, soon become coated with the urinary salts.

The *treatment* consists in extracting the stone by the method least liable to lead to subsequent incontinence of urine. There are four methods by which the removal may be accomplished. (1.) Dilatation of the urethra by sponge-tents, or by Weiss's three-bladed instrument, or by india-rubber bags which can be inflated after introduction, has often been resorted to; and by this practice large stones can be seized and extracted without risk to life. But whether the dilatation be produced slowly or rapidly, or while the patient is conscious or insensible from the inhalation of chloroform, it is very apt to be followed by permanent inability to retain the urine. My own view of this operation is so unfavorable that I shall not again resort to it, unless there is some peculiarity in the case specially requiring such a proceeding. Yet if it is practiced, I believe that there is more hope of preventing incontinence by rapid dilatation while the patient is under the influence of chloroform than by slowly stretching the urethra with sponge-tents, &c. (2.) Incision with dilatation has been advocated. This operation consists in incising or notching the external orifice of the urethra, either upwards towards the pubes, downwards in the direction of the vagina, or laterally; and then stretching the canal with Weiss's dilator until the finger can be made to pass into the bladder. The same objection, however, applies to this method as to the former one, and hence it is not to be recommended. (3.) Incision of the bladder (vaginal lithotomy) has been recommended by Dr. Marion Sims. The surgeon cuts through the vesico-vaginal septum, low enough down to avoid the peritoneum, into the bladder, upon a staff introduced through the urethra. The stone is seized by the forceps and removed; the edges of the wound being then brought together by metallic sutures, and the same treatment pursued as after the operation for vesico-vaginal fistula. For a few cases, where the stone is of large size and the bladder very irritable, this method will prove useful; but it ought only to be practiced by a surgeon who feels thoroughly confident of being able to cure the vaginal fistula. (4.) Lithotrity remains to be considered, and though mentioned last, yet I believe that in forty-nine cases out of fifty it is the only operation which should be resorted to for the removal of a stone from the female bladder. It is practiced without much difficulty, is attended with so little pain that chloroform is not required, and unless the stone be large, may often be completed at one or two sittings. The patient had better be directed to hold her water for about an hour before the operation. To allow of this being done without any inconvenience it may often be advisable to administer the tincture of buchu, or a decoction of the triticum repens for a few days previously, or the practitioner can trust to the use of the belladonna pessaries (F. 423), or of an enema

containing about twenty drops of the fluid extract of opium and the same quantity of the tincture of belladonna, in an ounce and a half of fluid starch. If, in spite of these sedatives, the urine come away, two or three ounces of tepid water ought to be injected just before introducing the lithotrite. On the day after the calculus has been well crushed, a short tube, having a diameter rather exceeding that of the largest-sized catheter, may be introduced through the urethra; and then the fragments of stone will generally be easily removed by washing out the bladder with warm water.

IV. DISEASES OF THE VAGINA.

1. VAGINAL OCCLUSION.—Putting aside those cases where the vagina is entirely absent, or is considerably malformed from some arrest of development, it will be found that the examples of occlusion of this membranous canal met with in practice may be arranged under one of three heads: (1) Those where the hymen is morbidly tough and persistent. (2) Instances of imperforate hymen, in which the vaginal orifice is completely closed. And (3) cases of imperforate vagina (atresia vaginæ); whether this be due to congenital adhesions between the opposite walls, or to closure in consequence of inflammation and sloughing, or to almost impermeable cicatrices, the result of prolonged or instrumental labor, or other mechanical injury.

A tough and persistent hymen gives rise to no inconvenience until sexual intercourse is attempted; for it does not interfere with the escape of the catamenia or of vaginal discharges. The practitioner is therefore only consulted when the rigidity of the membrane is such that it prevents intromission of the male organ. In this way the hymen will usually be a cause of sterility, although many cases are on record where fecundation has occurred while perfect connection must have been impossible. Some years since a medical man, now dead, consulted me two months after marriage as to the propriety of his dividing the hymen with the bistoury, as he found this structure so unyielding that he had been unable to break it down. And yet, at this time, the lady was three or four weeks advanced in pregnancy, and had just missed her catamenial period. The operation, however, was performed, and all further inconvenience obviated. In another patient, I found at the time of labor that the hymen had simply been perforated through its centre, the upper portion forming an irritable band which only yielded to the use of the knife. The treatment of persistent hymen is very simple. If the membrane cannot be ruptured with the finger it should be divided; reunion being prevented by the careful use of oiled lint. Where the vaginal orifice remains preternaturally small, after this operation, dilatation ought to be effected by the use of bougies.

Naturally, the hymen consists of a delicate semilunar fold of mucous membrane, stretched across the lower half of the vaginal orifice. But occasionally cases are met with where this canal is completely closed from the urethra to the fourchette by a firm membrane. In these examples of *imperforate hymen* it is most important that a cure be effected before the patient reaches the age of puberty. Fortunately it usually happens that the presence of this membrane is discovered by the child's mother while

the girl is quite young, and then there is neither difficulty nor danger in the surgeon breaking through the structure with a probe or director, or in cautiously dividing it with a bistoury. The edges of the wound must be kept apart by the introduction of small pledgets of oiled lint for a day or two, until cicatrization is complete.

Supposing, however, that the malformation is not remedied, important symptoms will be produced at the time of menstruation. For inasmuch as the membrane may present no orifice whatever, or (as most commonly happens) only a very small oblique one just below the urethra, so the proper escape of the catamenia must be prevented. The patient will experience all the general feelings and straining efforts (the menstrual molimina) which accompany the early monthly periods, but there will be no external discharge. As each time comes round, the constitutional disturbance, the backache, the sense of bearing down, and the feeling of weight about the pelvis will increase; and yet the cause of the loss of health and languor, of the irritability of the stomach and the sallowness of complexion, &c., may be unsuspected by the parents. The girl probably holds her tongue, either for the simple reason that she is ignorant of what should occur, or else because she is afraid and ashamed to make any complaint. In this way it sometimes happens that the vaginal canal and the uterine cavity become greatly dilated, while in a few instances the Fallopian tubes have also been considerably enlarged; for the retained menses may, in the course of time, amount to as much as three or four pints, or even more. If, in addition to the presence of this membrane, there be also occlusion of the os uteri, the catamenia will of course only accumulate in the cavity of the womb and in the canals of the oviducts; these organs gradually enlarging until perhaps the uterus can be distinguished through the abdominal walls as large as at the sixth or seventh month of pregnancy.

Now it is a curious fact, and one difficult of explanation, that where the menses have been retained owing to this imperforate condition of the hymen, the operation required is a very fatal one. On examining a woman so affected, the practitioner readily detects the bulging obstructing membrane at the orifice of the vagina; and it would seem a very simple proceeding to divide this septum and so permit of the escape of the distending treacle-like and fetid fluid. But however easy it may be to do this, it is well known that many of the cases which have been so operated upon have terminated fatally from endometritis or peritonitis; these inflammatory affections probably having their origin in some septic change produced in the imprisoned secretions by the action of the atmosphere. Nevertheless, in order to avoid ulceration and rupture of the walls of the uterus or of the Fallopian tubes, or an escape of the menstrual fluid through the fimbriated extremities of the tubes (pelvic hæmatocele), the obstruction must be removed either by a longitudinal or a crucial incision through the thickened hymen; though instead of looking on this proceeding lightly, every precaution ought to be taken to prevent inflammation subsequently. The patient must be kept very quiet in bed, her diet should be plain without being too low, and if there be pain it ought to be relieved by sufficient doses of opium. The bowels should be freely opened just before the operation, and then left quiet for some days. I would administer some preparation of sulphurous acid (F. 48) for several days prior to the surgical interference. A bandage had better also be placed round the lower part of the abdomen so as to facilitate the flow of the discharge. Whether it would be safer, at first, to draw off part of the fluid with a trocar and canula introduced under water while the patient is in a warm hip-bath, I cannot say; but it is not improbable that the effect of the air upon the

retained secretion in setting up decomposition might in this way be prevented. Mr. Baker Brown has recommened that instead of a simple cut or puncture, the hymen should be removed entire by a circular incision at the point of its junction with the labia; but in addition to the unnecessary severity of this proceeding, it would also seem probable that the larger the wound is made in these cases, the greater fear there is of absorption of fetid matters taking place. Whether the practitioner resorts to an incision or to complete excision, careful dressing with oiled lint must be had recourse to, so as to prevent adhesions forming between the labia; while even for some months afterwards examinations ought to be made now and then, lest dilatation be required to prevent the vaginal orifice from getting constricted.

The vaginal opening appearing quite normal, it may yet happen that the passage is more or less completely closed at some part of its course. *Imperforate vagina* from the presence of a thin transverse membrane, is the most simple congenital malformation of this description; and if this structure present an opening sufficiently free to allow of the escape of the catamenia, no inconvenience will result until the time of marriage. Comparatively harmless also is the division of the vagina, from the entrance to the os uteri, by a longitudinal partition. In these cases there is always a double uterus as well as the double vagina; and though generally one division of the latter canal is larger than the other, and is the only one which is used in coitus, yet cases have occurred where either portion has been used indifferently, and where pregnancy has taken place in both halves of the uterus at the same time. A much more serious condition is the conversion of a portion of the canal into a solid cord, owing to firm adhesions between the walls; so that on introducing the finger into the short vagina, this tube is found to end in a cul-de-sac. In these instances, the uterus and ovaries are usually either absent, or they exist in only a rudimentary state, so that there will be no secretion of the menstrual fluid. But if these organs be present and healthy, the catamenia will be retained, and will gradually produce a tumor as in the cases of imperforate hymen. Stricture or complete closure of the vagina may result from inflammation set up by disease, or it may be a consequence of the healing of cicatrices after injury inflicted by the use of instruments in a difficult labor. An interesting example of the first form has been reported by Mr. Hancock. In this case, the external organs of generation appeared healthy, but the vagina terminated about an inch from the orifice. The patient stated that she had menstruated regularly for two years; she then had an attack of fever, and the discharge never returned. Mr. Hancock dissected the tissues upwards for three inches, and afterwards dilated the canal by bougies; but no uterus could be discovered. There was no evidence of the existence of any collection of menstrual fluid.* Examples of stricture from the healing of cicatrices are not so very uncommon. I have seen a woman in strong labor, with almost complete obliteration of the vagina, as the consequence of ulceration and sloughing produced by the prolonged pressure of the head in the previous confinement. In April, 1851, I was consulted by Dr. Greenhalgh as to the best mode of effecting delivery in a woman slightly advanced beyond the eighth month of her fourth pregnancy; craniotomy having been required in the third labor. On examination, the canal of the vagina appeared to be one firm contracted cicatrix; although, after some perseverance, the finger could be insinuated between three or four small

* The Lancet, p. 470. London, May 21st, 1853.

rings of cartilaginous toughness, with sharp edges. In this instance labor was brought on, the woman being safely delivered after the free division of the rings and the peforation of the child's head; but I found it impossible to avoid wounding the rectum, the fistulous opening which formed necessitating subsequent treatment. Moreover, the strictured tissues were not incised, nor was the fœtal skull opened, until it was proved that the parts showed not the least disposition to yield, although the labor-pains were strong and recurred frequently.

While considering how we may best remedy these cases of imperforate vagina, it should be remembered that all operations upon this canal are attended with more or less decided risk. Consequently, it will be better to refuse to interfere when the woman is single and the catamenial flow is not obstructed. Moreover, it will be useless to attempt any surgical proceeding where the patient, being an adult, experiences no menstrual molimen, and has no sexual desire, for we may be tolerably sure the malformation is not confined to the vagina, but that the uterus and ovaries are also entirely absent, or at least that they are in a very rudimentary condition.* When the obstruction consists of transverse membranes, we shall often succeed in breaking them down with the finger, or in dilating them with bougies and sponge-tents. But if it be necessary on account of the thickness of the tissues to use the knife, great caution must be exercised to avoid wounding the bladder or rectum, as well as to prevent the sharp point of the scalpel from entering the cavity of the peritoneum above. To evade these accidents, the patient should be placed in the ordinary position for lithotomy: a sound ought to be introduced into the empty bladder, while sometimes it is advisable for the surgeon to keep the forefinger of his left hand in the rectum; the edges of the vaginal orifice are to be held widely apart by the hands of an assistant, or by Bozeman's duck-bill speculum, as in the operation for vesico-vaginal fistula; and then the septum had better be cautiously dissected through from side to side, until there is a gush of thick treacle-like fluid—the retained catamenia. Where this operation has been safely accomplished, care is to be taken to prevent any subsequent contraction, inasmuch as by inattention to this rule, interference has been required on a second occasion. With regard to those rare cares where the vagina ends in a cul-de-sac, a thorough investigation should be made so as to detect the smallest opening which could be dilated by bougies and tents. Supposing there is no orifice and no depression showing where there might be one, and if it be certain that there is an accumulation of the menses in the uterine cavity, it then becomes a question whether a dissection should be made in

* There are occasional exceptions to this rule. Thus, I was consulted by a young lady, in her twenty-first year, who had never menstruated, but who was engaged to be married. An examination showed that, though the external parts were perfectly natural, there was no vagina. No trace of this canal, or of uterus or ovaries, could be detected by the rectum. Being strongly urged to try some means of giving relief, I made a cautious dissection through the connective tissue where the vagina should be, and without injuring the bladder or rectum, or discovering any trace of internal generative organs, I succeeded in making an excellent canal. In this, to prevent contraction, a vulcanite tube four inches long by four in circumference, was worn for several months. The operation was performed on June 20th, 1867. On September 15th, 1868, this lady was married, the impossibility of her ever bearing children, as well as all other material points in the case, having been previously explained to the husband. Both parties, however, were determined on carrying out their engagement. Had it not been for this explanation, I am told it would not have been known that there was anything unusual. In another exactly similar case the patient was actually married before she consulted me. An artificial vagina has since been made. Although no trace of uterus or ovaries can be detected, there is no loss of sexual appetite. No menstrual molimen has ever been experienced.

the manner already described, or whether the uterus had better be punctured through the rectum so as to permit of the evacuation of its contents. The latter proceeding, though only justifiable where the former seems impracticable, has been successfully adopted in several instances. It is, however, always difficult to keep the artificial opening sufficiently patulous to allow of the woman menstruating for the future through the rectum, though this may be accomplished by, in the first instance, making the puncture sufficiently free to admit the point of the finger, and then by daily examinations preventing closure until the healing process at the edges of the wound is completed.

2. VAGINISMUS.—By this term Dr. Marion Sims has proposed to designate "an involuntary spasmodic closure of the mouth of the vagina, attended with such excessive supersensitiveness as to form a complete barrier to coition."* This affection must occasionally have been recognized by all practitioners who have had much experience in the treatment of the diseases of women, but to Dr. Sims is due the great credit of especially directing attention to it, of clearly describing its symptoms, and of suggesting the means of cure.

A few remarkable cases, in each of which there has been a combination of lead poisoning with vaginismus in its most intense degree, have been observed by Dr. Neftel of New York. The cause of the poisoning could only be traced to the long-continued employment of a cosmetic containing lead. The chief feature of interest, however, in these patients was this,—that the proper treatment of the saturnine poisoning not only removed the paralysis, but likewise cured the severe vaginal hyperæsthesia. Had it been otherwise, the combination of the two diseases would of course have been regarded as accidental. As it is, such an explanation is merely an easy way of evading a difficult question.

From the cases which have been under my own care, I believe that vaginismus may exist as a simple or as a complicated condition. In other words, there may be no local mischief beyond excessive tenderness of the orifice of the vagina and hymeneal membrane; so that almost the slightest touch, certainly any attempt to introduce the finger into the canal, produces the greatest agony. Or, in addition to this characteristic symptom, there may be indications of inflammation of the follicles about the vulva, or of a painful fissure of the fourchette, or of hyperæsthesia of the whole vaginal mucous membrane, or of some uterine displacement, or of a contracted state of the os uteri and cervical canal. But whether the disease exist in a complicated form or not, it is equally the bane of early married life. In some instances the woman may at first submit to intercourse, bearing the great suffering under the idea that it is not unusual. After a night or two, however, her courage fails, her nervous system begins to give way, she shivers with terror at the approach of her husband, and consequently all attempts at connection have to be abandoned. In another class of cases it is found that the marriage has never been consummated; or intercourse may have been imperfectly accomplished, but only with the result of setting up inflammation and excoriation about the vulva. The seat of this excessive sensitiveness is the vaginal outlet and especially the external surface of the hymen, whether this membrane be entire or partially broken down. The gentlest application to this structure or its remains (the caruncule myrtiformes) produces spasm of the sphincter vaginæ, so that even a probe

* Transactions of the Obstetrical Society of London, vol. iii, p. 362. London, 1862.

can scarcely be introduced beyond it. The influence of this condition upon the general health can readily be imagined. The mental distress, the imperfect sleep, the loss of appetite, and perhaps the pain on walking, the irritability of the bladder, the backache and tenderness about the hips, &c., all tend to render the sufferer an unhappy invalid. She looks careworn, her strength gradually fails, and she gets thin; and if there be any unkindness on the part of the husband the misery becomes intense.

Fortunately, if the suffering be great, the cure is not difficult. Supposing by a lucky accident the attempts at intercourse have led to pregnancy, then interference will be unnecessary; since the act of parturition will certainly prove an effectual remedy. Usually, however, sterility is one of the prominent results of true vaginismus. Under such circumstances it seems to me worse than useless to temporize with inefficient remedies, since they only increase the mental and bodily distress. The use of bougies, caustics, injections, &c., merely inflicts the greatest pain, without producing the slightest good. The treatment consists, as Dr. Sims very properly insists, in the removal of the hymen, the incision of the vaginal orifice, and in subsequent dilatation; and these proceedings should all be promptly and efficiently carried out. The bowels are to be thoroughly cleared out on the morning of the operation. Then the patient being placed on her left side, or upon her back, and being fully under the influence of chloroform, the sensitive and probably thickened hymen is to be seized with the forceps and completely dissected off. At the same time, the operator stretching the vaginal opening with two of the fingers of his left hand, makes an incision, about half an inch deep, through the fibres of the sphincter vaginæ at the lower part of the fourchette. If there be much bleeding, it may be checked by the application of a drop or two of the solution of perchloride of iron; though I think that the after-treatment is rendered more easy by plugging the vagina with cotton-wool, laying pledgets of oiled lint over the lower part of the orifice, and then keeping the whole in apposition by a T-bandage. The chief inconvenience attendant upon this latter measure is, that the catheter will have to be used every eight or twelve hours. The dressings ought not to be disturbed for forty-eight hours, during which time freedom from pain must be insured by the use of opium. There should also be perfect quietude. At the end of this time, chloroform is to be again administered, while the wool and lint are removed; and then a proper-sized tube of vulcanite is to be introduced, and kept in position by a bandage. If grooved upon its upper surface, this tube will not interfere with the urethra or meatus urinarius; and it should be worn for a few weeks. The smarting caused at first by this instrument is nothing as compared with the pain which has been experienced prior to any treatment. This procedure is rather different from that recommended by Dr. Sims; but it has the advantage of being less severe, while from actual experience I can assert that it is quite as efficient. I have said nothing about the management of the complications, because they will have to be remedied subsequently according to the rules laid down in speaking of each affection separately.

3. ACUTE VAGINITIS.—This form of inflammation is much more rarely met with than the chronic variety; from which it differs not only in its greater severity and more rapid progress, but also in its usually involving the whole tract of mucous membrane lining the vaginal canal, instead of being limited to one portion. Moreover, in acute vaginitis the morbid action is not always confined to the mucous membrane; the tissues beneath sometimes becoming involved, producing a very distressing affection. It is seldom observed in women who have not had intercourse.

Causes.—This disease, unless due to some specific poison, rarely occurs save in those who are in a depressed state of health. When the vital power is low from bad living or from the excessive use of alcoholic drinks, the inflammation may be excited by exposure to cold and wet, and perhaps by inattention to cleanliness. Hence it is more frequently met with in hospital than in private practice. Excessive sexual intercourse can, however, give rise to it; and so will the use of force—as in rape. The prolonged pressure of the child's head in tedious labors, as well as mischief inflicted by craniotomy instruments or the forceps, must also be remembered as causes. I have never seen it produced by rising too soon after parturition, and cannot believe in such a proceeding having any effect in inducing this form of inflammation.

Symptoms.—The chief symptoms consist of itching and excoriation about the vulva, weight at the perineum, distressing irritability of the bladder, with pain and a sense of heat extending up the vagina. At first, the secretion of vaginal mucus is checked; so that on examination the mucous membrane of the canal is found somewhat dry and swollen. There may be no alteration in color from the natural appearance: more often the whole tissue is seen of a scarlet tint, or it is marked with red patches. Then, shortly, a creamy mucous, or muco-purulent, or purulent discharge takes place; the pain lessening as the fluid poured out becomes abundant. This discharge, like the healthy vaginal mucus, is of acid reaction; while if it can come away freely it is seldom offensive. A minute examination shows that it contains pus-corpuscles with an abundance of squamous epithelium and epithelial débris. The constitutional disturbance is usually slight; but there may be more or less backache, pains about the hips and upper part of the thighs, a sense of weight or bearing-down on standing, smarting and tenderness on sitting down or on passing a motion, with a frequent desire to empty the bladder. The disease commonly runs its entire course, or passes into the chronic form, in from seven to thirty days; the duration partly depending upon whether a cure can be effected before the return of a catamenial period, as otherwise the symptoms are sure to be aggravated by the menstrual molimen.

Sometimes, owing to neglect or to the severity of the attack, the progress towards recovery gets interrupted. Thus, supposing there occurs a sharp rigor, with severe frontal headache, thirst, a loaded tongue, and a frequent pulse, we may be tolerably certain that the morbid action has extended to the structures beneath the mucous lining, and that it is advancing to suppuration. Under such circumstances the local soreness and the throbbing pains will prove most severe. In this way, a troublesome and very painful affection may be set up, which will continue for many weeks, to the marked injury of the general health. The abscesses which form generally burst into the vagina; though the pus is apt to burrow and make its way externally, either at the sides of the labia or about the perineum, probably leaving long and tortuous fistulæ, which can only be healed with great difficulty.

Diagnosis.—Acute vaginitis can scarcely be confounded with acute inflammation of the cervix uteri. The appearances on examination and the nature of the discharge will serve to prevent any error. The mucus of the cervical canal is always alkaline; and though the acidity of the vaginal secretion will neutralize a moderate quantity of uterine discharge, yet it will not suffice to do so when the latter is abundant. Moreover, the menstrual functions are probably never interfered with when the disease is confined to the vagina; though this secretion commonly appears too frequently, too abundantly, and is accompanied with much pain when the

uterus is affected. The difficulty of distinguishing between non-specific vaginitis and gonorrhœa has already been noticed (p. 264). The application of the discharge poured out in acute vaginitis to the male urethra, will produce a disease in all respects resembling true gonorrhœa.

Treatment.—When the case is seen early, no remedy gives so much relief as the prolonged use of the hot hip bath, night and morning. In severe cases it will be well to add some carbonate of soda and a strong decoction of poppy capsules to the bath water. The bowels, which may be obstinately confined, should be unloaded by a full dose of castor oil, or of calomel and jalap (F. 140), or of jalap and senna (F. 151); after which it is unadvisable to irritate them further by purgatives. Vaginal injections of warm water prove serviceable; but instead of sedative or astringent injections, pessaries of oxide of zinc and belladonna, or of acetate of lead and opium (F. 423) will be found most efficacious. The patient should be confined to the sofa, or even to the bed, at the commencement. The diet is to consist of white fish, lightly cooked eggs, tea and milk, with demulcent drinks; while all stimulants are to be forbidden. Where there is evidence of the occurrence of suppuration, opium and henbane (F. 343, 345), with ammonia and bark (F. 371), will be needed; and then nourishing animal food, with wine, ought to be allowed. Hot fomentations, or large linseed poultices, to the lower part of the abdomen as well as to the vulva, should be employed. When the abscesses begin to "point," they had better be opened.

4. VAGINAL CATARRH.—Chronic inflammation of the vagina may occur primarily and singly, or it can happen as an accompaniment of most uterine diseases, or it may be the sequel of acute vaginitis. Probably chronic vaginitis, or vaginal catarrh, or vaginal leucorrhœa (for the terms may be regarded as synonymous) is the most common disorder to which women are liable. There are indeed few who do not more or less suffer from it during the childbearing period of life, so numerous and even slight are the causes which will induce it.

Symptoms.—The prominent symptom is a constant or frequent leucorrhœal [from λευκὸς = white + ῥέω = to flow] discharge—"the whites." Advice is seldom sought until this discharge has become profuse, or has continued a long time; and then in addition to speaking of it, complaint is made of backache, a sense of weariness after slight exertion, loss of appetite, lowness of spirits, flatulence or nausea or some other form of indigestion, and frequently of constipation. This low kind of inflammation is often confined to the upper part of the vagina, and to the external portion of the cervix uteri; in which districts the mucous membrane may perhaps be found on examination congested and of a purple tint, though more commonly there is no perceptible change. The disease is always obstinate, partly because it gets aggravated at the return of each monthly period.

Under the influence of inflammation the epithelial covering of the mucous membrane of the vagina will now and then be exfoliated. Sometimes this epithelium mixed with mucus comes away in flakes, or it may be passed in masses, which form complete casts of the vaginal canal. By the microscope these pseudo-membranous, parchment-like laminæ can be seen to be composed of large epithelial cells of the tessellated variety; and they are generally sufficiently strong and firm to bear free handling. They are not unfrequently expelled when slight inflammatory action has been set up by the use of strong astringent injections. So again, in the vaginitis which occurs after scarlet fever, detached fragments of epithelium will commonly be discovered in the discharge. The symptoms attendant upon this exfolia-

tion are slight or well-marked, according as a new and sufficiently dense layer of cells is slowly or rapidly formed. In the latter case, there may be merely slight heat and irritation: in the former, the raw surface is very sensitive, and there will be much pain and smarting. In either instance, as the membrane is becoming detached, a peculiarly unpleasant crawling sensation has been complained of. Care must be taken not to confound these vaginal membranes with those uterine structures which are not unfrequently thrown off in one form of painful menstruation,—membranous dysmenorrhœa.

Diagnosis.—In a state of perfect health only sufficient mucus is secreted to lubricate the flattened vaginal canal, and so prevent irritation from the friction which necessarily occurs between the apposed anterior and posterior walls. But under the influence of any morbid conditions, a more or less abundant discharge comes away; and the important question which generally arises is as to the seat of this flow. In other words, is the case one of vaginal or of uterine catarrh? The distinction can generally be drawn from an examination of the discharges. Thus, the vaginal mucus, whether scanty or abundant, is universally acid; and it is owing to this reaction that the secretion is found opaque and curdy. The mucus of the cervical canal is always alkaline; so that if a piece of litmus-paper be reddened by application to the vaginal portion of the cervix, the blue color will be restored on passing the test-paper within the cavity. Moreover, the mucus as it is seen by the speculum escaping through the os from the interior of the cervix is viscid and transparent, so that it resembles the white of egg; though it becomes opaque as it passes through the vagina owing to the action of the acid reaction. A minute examination shows that the discharge from both parts consists of epithelium, mucus- or pus-corpuscles, and a plastic liquid; but the vaginal epithelium is of the pavement or tessellated variety, while the cervical is of the cylindrical kind. Of course, where there is chronic vaginitis in conjunction with disease of the interior of the cervix, then the discharge will necessarily partake of the nature of both secretions. Moreover, when there is an abundant secretion of pus from the vaginal mucous membrane this fluid may be found alkaline. Unless the bodily strength becomes much depressed, the menstrual functions are not interfered with in cases of vaginal leucorrhœa.

Treatment.—As in other disorders the first point is to remove the cause. The general health must be attended to, one of the mineral acids with bark or quinine being administered if necessary; while the digestive organs should be made to do their work efficiently, pepsin sometimes proving useful for this purpose. The frequency of sexual intercourse ought at least to be limited. Any disease of the urethra, vulva, or rectum which may be present is to be cured. Then, cold salt-water hip baths, and astringent vaginal injections (F. 425) are to be employed; the latter being used in quantities of not less than a pint at a time, while they are to be thrown up slowly and deliberately with a proper siphon syringe. It is rather remarkable that the small old-fashioned glass and metal female syringes are still to be found in every druggist's shop, and yet more useless instruments could scarcely be manufactured. Who can be found to order such obsolete toys is the wonder. After a cure has been effected, the woman who desires to remain well will inject up the vagina a pint of cold or tepid water every morning, while using the bidet for the external organs. Where injections fail to give relief, pessaries containing sulphate of zinc or tannin (from ten to fifteen grains of either with sixty or eighty grains of cacao butter) may be substituted. Moreover, if the pain in the back continue bad, a belladonna plaster had better be applied; while the system is to be

strengthened by tonics, sea air, &c. As a rule, the diet should be generous and nourishing; while if any stimulant be needed weak brandy and water had better be allowed in preference to wine or beer.

In not a few instances I have found that a low form of inflammation has been kept up by the irritation of a painful *fissure* or *ulcer* at the fourchette. Although this can sometimes be cured by two or three days' rest in bed, and the application of the dilute solution of subacetate of lead, or of zinc ointment, yet this plan often fails. The most certain and efficacious proceeding is to make a longitudinal incision, the eighth of an inch in depth, through the ulcer, so as to divide the fibres of the sphincter vaginæ muscle. The patient ought to remain in bed until the wound has healed; and if cicatrization proceed too slowly the red lotion (F. 264) may be used as an efficient dressing.

The foregoing remedies will have but little influence for the cure of uterine catarrh. In such cases, therefore, the treatment described in a subsequent page will have to be adopted.

5. TUMORS OF THE VAGINA.—A physician may be engaged for many years in treating the diseases peculiar to women before he meets with a case of *polypus of the vagina*. Tumors so designated, having a firm fibrous structure, do occasionally grow, however, from one or other of the vaginal walls. In an instance which came under my own observation, advice was sought for a "falling of the womb." On examination, a firm growth could be detected presenting at the orifice of the vagina. By gently drawing the tumor downwards, it was seen to be as large as a small orange, having an attachment to the middle of the posterior wall of the vagina by a pedicle equal in circumference to that of the little finger. The chief inconvenience which resulted from this body consisted of an abundant leucorrhœal discharge, a constant bearing-down, and some irritability of the rectum and bladder. As a vessel could be felt pulsating in the pedicle, a ligature was placed around it, and then the growth was cut off just below the constricted part. The ligature came away on the fifth day, and the patient has since remained well.

More rare even than the foregoing are *fibrous tumors imbedded in the submucous tissue of the vaginal wall*. When a growth of this description exists, it may produce very slight general or local derangement; though usually the vaginal walls get inflamed and excoriated, much as they do when long irritated by any kind of foreign body. Sometimes there is bleeding to a considerable extent: in a case which was under the care of Mr. Paget the tumor gave rise to repeated attacks of vaginal hemorrhage. Mr. Curling extirpated one of these growths which projected at the vulva, was extensively ulcerated, and was the cause of an irritating fetid discharge. The tumor was formed of a mass of dense fibrous tissue, partly arranged in lobules, while it was developed in the submucous connective tissue of the vagina. Sometimes these tumors are associated with similar growths in the uterine walls. Whether this be the case or not, or whether the growth be troublesome or not, a cure should be effected, if possible; for such a body may grow to a large size, while in the event of pregnancy it would certainly complicate the process of parturition. The removal may probably be safely accomplished by seizing the growth with a pair of vulsellum forceps, drawing it downwards, dividing the mucous membrane covering it, and then shelling it out with the fingers or the handle of the scalpel. If there be any free bleeding, the vagina should be firmly plugged with cotton-wool.

Mucous follicular cysts are occasionally found about the walls of the vagina. When *superficial*, the cyst is formed by a dilated follicle, the

excretory orifice of which has become closed: it seldom attains a larger size than a pea, since its thin coats are easily ruptured: often there is only a simple round cyst, though two or three may be met with, their walls being transparent: and they are most commonly situated about the vestibule, or at the sides of the lower part of the vaginal opening. The *deepseated* cysts are produced by the accumulation of the contents of the interstitial or closed follicles; and one or more of this variety may exist alone, or in combination with the superficial kind. Usually solitary, these cysts will vary in size from that of a hazelnut to that of a fowl's egg; they are painless, but produce an unpleasant sense of fulness; they may become pedellated; they seldom rupture spontaneously, owing to the firmness of their smooth and shining coats; and they are almost invariably situated at the upper part of the vagina, near the cervix uteri. To cure either the superficial or deep cysts it is necessary to puncture them, and then to apply the nitrate of silver to their internal surfaces. Where pedellated, it is better to snip them off with a pair of curved scissors. In operating upon the deep kind, care must be taken to avoid wounding the bladder when the tumor is in the anterior walls of the vagina, or the rectum when the posterior wall is the affected part.

6. PROLAPSUS OF THE VAGINA.—The descent of the vaginal walls is generally accompanied by more or less prolapsus of the uterus, although occasionally it occurs alone. Seeing that the uterus is partly kept in its place by the vagina, it is difficult to understand how the latter can become prolapsed without the former also falling. Certainly, I have never met with an example of complete and uncomplicated vaginal prolapsus in a single woman. And even among married women, such an event is rare; the cause, in those cases which have come under my care, having been either a failure in the walls of this canal to recover their tone after several pregnancies and labors, or a withdrawal of their support in consequence of a laceration of the perineum.

Much more common than these cases of complete, are those of partial prolapsus, where either the anterior or the posterior wall of the vagina descends. The anterior wall, according to my experience, is less frequently displaced than the posterior. When the anterior wall is alone affected, this portion in its fall draws down the posterior wall of the bladder; giving rise to a condition which is generally known as *vaginal cystocele*, or *vesico-vaginal hernia*. The result of this is the formation of a vesical pouch; in extreme examples of which condition the urine may accumulate and decompose and set up vesical catarrh, owing to the difficulty which is experienced in completely emptying the bladder. Patients repeatedly have to remove this difficulty by pressing the vaginal protrusion upwards during each attempt at micturition, although complete reduction cannot always be thus effected. If a catheter be passed into the bladder, the end of the instrument can be felt in the pouch through the vaginal wall. On passing the finger along the upper surface of the protrusion, its progress is stopped under the pubic arch; but below the tumor it can be made to enter the vagina up to the os uteri.

The lower part of the anterior wall of the rectum is apt to become dilated; a pocket being formed which pushes forward the posterior wall of the vagina, and ultimately causes a protrusion at the vulva. This displacement is spoken of as *vaginal rectocele* or *recto-vaginal hernia*. It is the consequence of a loss of elasticity in the vaginal septum, of habitual constipation, and of excessive straining to pass the accumulated fæces. It may produce but slight inconvenience at first; but after a time, as the

rectal pouch increases in size and becomes loaded with dry and hard fecal masses, so that the external tumor is made to acquire the size of a fist, troublesome consequences ensue. The chief of these are,—a sense of weight and bearing-down, pain on walking, a constant mucous discharge from the irritated mucous lining of the rectum, as well as a varicose condition of the hæmorrhoidal veins. On introducing the finger into the rectum it will readily enter the diverticulum when this is empty, or it will come upon the dense and firmly lodged stercoraceous mass.

Supposing a loop of small intestine to descend into the cul-de-sac between the rectum and vagina, it will in time, probably, push the posterior wall of the latter forwards and downwards. Hence, there will be produced a swelling at the vulva; which is technically described as *vaginal enterocele*, or *entero-vaginal hernia*. Under such circumstances, the progress of parturition has been delayed by the intestine giving rise to an obstructing tumor, which has had to be reduced. Necessarily there is a fear of intestinal obstruction or bruising taking place, either of which accidents might be followed by serious consequences.

All forms of vaginal prolapsus may occur, either suddenly or gradually. Sudden displacement is due to anything which induces violent contraction of the abdominal muscles; so that the intestines are abruptly forced down upon the pelvic viscera. More frequently the extrusion takes place slowly and gradually; the vaginal walls being weakened by frequent parturition, by long-continued catarrh, by rupture or loss of tonicity in the perineum, and so on. Moreover, the prolapsed part is at first small; but this portion, like the thin edge of the wedge, serves gradually to secure greater and greater displacement.

The principal symptoms of prolapsus of the vagina are,—bearing-down pains, aggravated by exercise; feelings of weight and fulness and irritation about the vulva, and sensations of throbbing and heat and general discomfort throughout the pelvic viscera. Backache is always mentioned as being troublesome. The general health is never really good: the digestive organs are especially apt to be deranged.

When the whole circumference of the vaginal mucous membrane is prolapsed, we find at the vulva a projecting tumor, the surface of which, if the descent be of long standing, is generally inflamed and indurated and more or less excoriated. As the fall of the anterior wall is usually the most complete, the opening leading up to the uterus is somewhat concealed at the lower and posterior part of the projecting mass; while on passing the finger up the passage the os uteri is met with, drawn more or less downwards. The functions of the bladder and rectum may be uninterfered with: although more frequently complaint is made of some irritability of the former viscus.

For the cure of displacement of the vagina which has occurred suddenly, nothing more is necessary than the reduction of this organ, with the use for a few days or weeks of astringent pessaries (F. 423). The patient may be kept in bed for two or three days, as a matter of precaution, while care is necessary that the bowels act without any straining efforts being needed. In attempting to remedy, either complete or partial prolapsus of the vagina which has come on gradually, it will be necessary to improve the general health; while such agents are administered as provoke muscular contraction, and impart tone to the tissues generally. A nourishing diet, the daily use of cold salt-water hip baths, with such tonics as quinine and steel and strychnia (F. 380), or phosphoric acid and nux vomica and bark (F. 376, 414) will always prove useful. The tissues of the vagina can also be strengthened by the proper employment of astringent injections (F. 425), or of pes-

saries containing tannin and catechu (F. 423). Where there is prolapsus of the posterior wall of the bladder, care must be taken to prevent the undue accumulation of urine. The patient should be recommended to pass water every three or four hours, and before doing so to try and push up the protrusion. The catheter, however, must be employed, rather than allow of any decomposition of the retained secretion. Similarly, in cases of rectocele, the bowel ought to be carefully emptied at least once a day; a full evacuation being obtained by the administration of pills of colocynth or aloes and nux vomica (F. 175), or ofttimes preferably by stimulating enemata (F. 190). Should the practitioner detect any excessive fecal accumulation, it may be necessary, in the first instance, to remove it with the scoop.

Abdominal belts, made so as to prevent the viscera from pressing on the pelvic organs, can often be worn with benefit. Now and then it is advantageous to have a perineal band affixed to the belt; especially where the prolapsus has been of such long continuance that the structures about the vulva have become much relaxed. Vaginal pessaries, whether they consist of elastic air-bags, or rings or levers, or globes of wood, are seldom to be recommended. They may, perhaps, act beneficially for a short time; but their ultimate effect will be to aggravate the evil instead of removing it.

For severe cases of prolapsus without any rupture of the perineum, an operation is often practiced to diminish the size of the vaginal outlet. As this subject is referred to in the section on procidentia uteri, I need only here say that I have but little confidence in its efficacy. Moreover, I do not recollect having seen any instance where it has appeared necessary to lessen the calibre of the vaginal canal by dissecting off one or more strips of the mucous membrane, and bringing the edges together with interrupted sutures; although in any exceptional instance, when other remedies have failed, this proceeding might doubtless be resorted to with advantage.

Finally where there exists a *rupture of the perineum*, surgical treatment proves invaluable. This accident results from parturition; the tear occurring in consequence of an excessive disproportion between the size of the fœtal head and the maternal outlet, or owing to the employment of instruments—especially the forceps. Under either circumstance the practitioner may be blameless; for in certain instances rupture will happen in spite of the greatest skill, and of the most unwearied attention. The injury will vary in degree; the rupture only involving the fourchette and part of the perineum, or extending up to the sphincter ani, or going completely through this muscle, or tearing the sphincter and part of the recto-vaginal septum. In all these grades there is a subsequent tendency to prolapsus of the vagina, with cystocele or rectocele; to procidentia of the uterus: and to excoriations about the labia uteri, with leucorrhœa, &c. But when the sphincter ani is injured, then (in addition to the foregoing evils) there will be more or less inability to retain the intestinal gases and stools; the latter coming away involuntarily whenever there is any approach to diarrhœa. The misery caused by this misfortune can easily be estimated. Fortunately, however extensive the laceration, a cure can be promised; though it does not follow that success will always attend the first attempt. A great deal depends on the patient being prepared for the proceeding by having the intestinal canal thoroughly cleared out, as well as upon her composure and quietude for several days after the operation. Briefly described, this may be said to consist in completely denuding the surfaces of the cicatrix, as well as the tissues just above them; and in then bringing them into close and firm apposition by the clamp or quill suture, with superficial sutures of silver wire. Where the sphincter ani has been torn through, this structure

should be divided on both sides (as recommended by Mr. Baker Brown) before inserting the sutures; but in other cases such a proceeding will be unnecessary. During the after-management the patient is to lie quietly on a water-bed; the bladder is to be emptied by the catheter every six or eight hours, for the first eight days; the bowels are to be kept confined until adhesion is perfect; and the occurrence of pain and intestinal action must be prevented by the administration of opium. The deep sutures are to be withdrawn at the end of forty-eight hours, and the superficial ones about the seventh day. The diet throughout should consist of plenty of milk, raw eggs, wine, and mutton or poultry. Attention must be paid to quantity as well as quality: if we give too little food the surfaces of the perineum will probably not unite kindly; if we allow too much, we shall be encouraging the formation of a large and hard stool, which may very likely tear asunder the newly joined tissues when it comes away.

V. DISEASES OF THE BROAD LIGAMENT.

The diseases now to be described have been included under the above heading in deference to the authors of the Nomenclature of Diseases adopted by the Royal College of Physicians. For with the exception of certain cystic degenerations there is not one of the following affections the seat of which is limited to, or even chiefly connected with, the broad ligaments. The morbid action is linked with the uterus and its appendages, the tubes, ovaries, and broad ligaments. The starting-point of the mischief is usually from the inner surface of the uterus, or from the ovary, or from the oviduct; and not simply from those folds of peritoneum and connective tissue between them, which together constitute the broad ligament. However, with reference to all these diseases it must be recollected that our knowledge is at present in a rudimentary state; and consequently many of the observations which follow may have to be modified by and by, as our opportunities for investigation and comparison have become multiplied.

1. PELVIC CELLULITIS.—Inflammation of the abundant loose cellular (connective) tissue in connection with the uterine appendages is a very important disease, our knowledge of which has been much increased by recent investigations. Its principal synonyms are *pelvic abscess, parametritis, peri-uterine phlegmon, inflammation and abscess of the uterine appendages, inflammation of the broad ligaments, &c.* The designation "pelvic cellulitis" is to be considered in the light of a convertible term with "parametritis" as employed by Virchow, Duncan, &c.; just as "pelvic peritonitis" is synonymous with "perimetritis." Dr. Matthews Duncan, in his work just published (1869) "On Perimetritis and Parametritis," distinctly confines these terms to the signification of inflammation and abscess in connection with uterine, tubal, and ovarian disease. By "perimetritis" he strictly implies inflammation of the uterine peritoneum; by "parametritis" he means inflammation of the cellular tissue in connection with the uterus.

The inflammation is necessarily seldom limited to its primary seat. The mischief spreads to the adjoining textures, and probably by direct continuity of tissue; just as acute morbid action is very frequently propagated in other parts of the body.

Causes.—Pelvic cellulitis occurs most frequently after parturition at the

full term, or after abortion; or it may be originated by dilating or cutting or cauterizing operations on the uterus, or by the abuse of the uterine sound, or by excessive sexual intercourse, or by gonorrhœal or syphilitic or malignant disease, or by acute or chronic ovarian or uterine affections. Gestation, whether abruptly and prematurely terminated, or carried on to the full term, is the cause of probably two-thirds of the cases of this disorder which are met with. The important point, however, is this,—pelvic cellulitis seldom, if ever, happens except as a secondary disease. It may be said not to occur after the change of life. In one case under my care it did so, but only as the consequence of mischief set up by the removal of an intra-uterine fibroid.

Puerperal pelvic cellulitis is of much more common occurrence in primiparæ than in multiparæ; and the longer the duration of labor, the greater appears to be the liability to it. A depressed state of health prior to parturition, and the setting in of hemorrhage during this process, also predispose to it. In some epidemics of puerperal fever there has appeared to be an unusual tendency to inflammation and abscess of the uterine appendages; though it must be remembered that the form of inflammation under consideration may happen quite independently of puerperal peritonitis or metro-peritonitis. There is no essential difference between puerperal and non-puerperal cellulitis: the morbid action, however, runs a more rapid course in the former than in the latter, perhaps owing to the effect of that remarkable series of changes in the uterus which commences directly after parturition.

Pathology.—There is an abundance of loose connective tissue in the pelvis; especially between the broad ligaments, between the vagina and rectum, between the uterus and bladder, as well as about the psoas and iliacus muscles. Beneath the peritoneum investing the fundus and upper three-fourths of the front and back of the body of the uterus there is only the merest trace of connective tissue: in fact, so difficult is it to demonstrate the presence of this tissue in these parts, that some authors deny its existence there.

Inflammation attacking the connective tissue of the uterus runs the same course as inflammation elsewhere. The disease will be extensive or partial. Starting from the uterus, the morbid action may spread widely. Thus, the whole of the cellular tissue and peritoneal lining of the pelvis is sometimes involved; or the connective tissue between the folds of one or both broad ligaments will be affected; or the inflammation may be limited to the tissues between the uterus and bladder, or to those between the uterus and rectum.

The disease may end in resolution, and leave no trace of its having been present; or it may subside favorably, though it causes long-persistent thickening and induration of the affected tissue, with immobility of the uterus; or it will perhaps terminate in suppuration,—pelvic abscess. Except where the inflammation is connected with puerperal fever, the great majority of the cases recover; although where suppuration takes place, the restoration to health will be very slow.

Symptoms.—Occasionally this disorder comes on very insidiously with mere weakness; so that its existence is not suspected until there is found considerable swelling about the pelvis or the lower part of the abdomen, and when the tissues about the uterus and broad ligaments have got indurated and perhaps matted together. More frequently, however, there is marked constitutional disturbance at the onset. The pulse rises in frequency, and the countenance becomes anxious. There is more or less fever backache, loss of appetite, restlessness at night, and a sense of pelvic weight

and bearing-down; together with local pain and throbbing and tenderness. An aching of the limbs is often complained of, especially about the upper part of the thighs. There may either be frequent or difficult micturition, or attacks of tenesmus; one or other prevailing according as the tissue in front of, or behind, the vagina is involved. In some of the instances which have been under my care there has been very troublesome irritability of the stomach, inducing frequent vomitings of fluid or mucus tinged with bile. At the end of about forty-eight hours, a proper examination will always detect the presence of a puffy and sensitive condition of the vaginal walls; while a little later the affected connective tissue can be felt in a state of induration and thickening. If the tissue of the broad ligaments be the part inflamed, this hardening and swelling may possibly be perceptible at the lower region of the abdomen; but where the morbid action is confined to one side of the uterus, or to the vesico-vaginal or recto-vaginal septum, an internal examination must be made to discover it. This tumefaction is probably the result of œdema of the connective tissue.

Pelvic cellulitis often terminates by resolution in the course of fourteen or twenty-one days. This, however, is not so likely to happen when the disease has ensued upon pelvic peritonitis, or on endometritis, or ovaritis, or inflammation of the oviduct. Supposing that the inflammation runs on to suppuration, to the production of pelvic abscess, the local and constitutional distress will be found to increase in severity. The general symptoms in pelvic abscess very much resemble those produced by suppuration in other organs. There are chills or rigors, fever and sweating, sleeplessness, great thirst with loss of appetite, and both mental and bodily depression. In addition, there is severe throbbing pain about the pelvis; with more or less irritability of the bladder and rectum. By combining a vaginal examination with abdominal palpation a peculiar elastic tumor will be felt, or possibly only a general fulness and œdema of the tissues.

A pelvic abscess may open into the rectum or vagina, or through the abdominal walls, or into the cavity of the peritoneum, or into the bladder. The opening into the rectum is the most common. While the pus is being alternately discharged and resecreted pregnancy may possibly occur, and prove a very serious complication.

Diagnosis.—Pelvic cellulitis is only likely to be seriously confounded with an inflamed fibroid tumor of the uterus, an inflamed ovary, an extra-uterine pregnancy, and pelvic hæmatocele. From the first I know not how it can well be distinguished; and it seems to me that our only hope of avoiding error is by recollecting that inflammation of fibroids is a rare occurrence, while it very seldom happens without the presence of such a growth having been previously determined. A fibroid uninflamed cannot possibly be mistaken for an acute phlegmon. An inflamed ovary presents many symptoms like those set up by cellulitis. However, in the latter the swelling is more extensive, and the pain much less severe and less localized; there is a great difference between the loose connective tissue, and the unyielding and firm fibrous capsule of the ovary. Ovaritis, moreover, very rarely ends in suppuration. In extra-uterine fœtation the symptoms come on very gradually, the catamenia are usually suspended, the breasts enlarge and the areolæ darken, while there is only slight tenderness about the cervix uteri. Of course, if the gestation be advanced the fœtal heart will be heard. The abdominal pains are severe, but they come on irregularly, continue only a short time, and then temporarily cease. Pelvic hæmatocele produces suddenly a soft and comparatively painless tumor, without fever, and without heat and swelling of the vaginal walls. Local peritonitis sets in subsequently. The hemorrhage often oc-

curs at a catamenial period, especially when there has been suppression of the flow for some previous occasions. The symptoms generally point to depression from loss of blood, rather than to inflammatory excitement. An exploratory puncture with a fine trocar and canula can at most times be made without risk to clear up any doubt. May be, however, the blood which has been poured out has undergone a kind of suppuration, and then there will be all the indications of a pelvic abscess.

Prognosis.—Caution is necessary in giving an opinion as to the duration and mode of termination of this disease. The inflammation is apt to spread insidiously; and when all seems to be going on well, a slight cause may again light up the mischief. As a general rule, experience justifies our looking for recovery ultimately.

Treatment.—In the early stages, when there is a hope that the inflammation may end in resolution, the practitioner should beware of resorting to very active treatment. The evil will probably be increased by the use of general bleeding, or of strong purgatives. But if the pain and throbbing be very distressing, a few leeches may be applied to the lower part of the abdomen, or around the anus, or even to the seat of fulness in the vaginal wall; while a dose of some mild aperient can be administered if the bowels have become confined. The remedies, however, in which I have the most confidence are,—the application of linseed poultices or poppy fomentations; the use of vaginal pessaries containing the extracts of belladonna and conium (F. 423), with mercurial ointment if there be any evidence of a syphilitic taint; the employment every eight or twelve hours of the officinal opiate enema, or of the subcutaneous injection of morphia (F. 314); together with complete rest in bed. If there be much abdominal tenderness, relief will be more effectually given by covering the part with a mixture of the extracts of belladonna and poppies (F. 297) and a linseed poultice, than by simple fomentations. Hot hip-baths, with hot-water vaginal injections, are very soothing and agreeable; but the patient should keep as quiet as possible in the recumbent posture, while the bath and injection require more exertion than can well be borne during the acute stage of the inflammation. Support must be given in the shape of milk, raw eggs, arrowroot, broth, beef tea, &c.; while any irritability of stomach which may be present will be best relieved by the application of a sinapism over the epigastrium, and by allowing a free supply of ice.

As soon as the acute symptoms have subsided, some authorities recommend the application of blisters over the hypogastrium, together with the administration of full doses of iodide of potassium, in order to procure absorption of the effused materials. I have, however, no confidence in the efficacy of these remedies to produce the desired effect; while I am also of opinion that such a line of practice is very likely to cause suppuration. We may depend upon it that when a case of this kind is doing well, the less we interfere with active treatment the better.

Where the disease advances to suppuration, wine and tonics will be required in addition to the foregoing. The question as to the necessity for operative interference will be discussed presently.

2. PELVIC PERITONITIS.—Inflammation of the peritoneum covering the uterus and its appendages is not to be confounded with general peritonitis. The form of peritoneal inflammation now to be considered is strictly limited to the pelvis. Its synonyms are *pelvi-peritonitis*, *metro-peritonitis*, *perimetritis*, &c. The disease has mostly been confounded with pelvic cellulitis, from which it differs in many important points,—just as pericarditis

differs from carditis, pleurisy from pneumonia, and meningitis from cerebritis.

Causes.—The causes of inflammation of the serous membrane covering the uterus and other pelvic viscera are pelvic cellulitis, metritis and ovaritis, inflammation of the oviducts, parturition at the full term or premature labor, mischief set up by operative proceedings, injections into the uterine cavity, and gonorrhœal or other irritating discharges passing into the uterus; as well as most of those circumstances which interfere with the healthy performance of the menstrual functions, or which excite tubo-ovarian disease.

Pathology.—As elsewhere happens, the inflammation at first produces congestion and redness, with harshness and dryness of the affected tissue. Next, there is swelling and immobility of the uterus and its appendages, owing to the exudation of plastic lymph and serum. And then, lastly, there is either absorption of the serous fluid, or the mischief extends in violence till it ends in suppuration, while the exuded lymph gets organized, and by its contraction binds the uterine organs together almost like a tumor.

Symptoms.—These will vary according as the disease is acute or chronic. In the former there is generally chilliness followed by pain. Often the suffering is slight, merely fretting the patient; now and then it is unendurable, causing involuntary cries or shrieks. The more sudden and rapid the action of the exciting cause, the greater will be the intensity of the pain. There is always a marked amount of tenderness about the hypogastrium, increased by pressure. The skin is hot, the pulse frequent, and the countenance anxious. There is backache, with pains down the thighs; neither of these symptoms, however, are as constant or severe as in pelvic cellulitis. Ofttimes there are excessive nausea and vomiting, while as a rule there is tympanites with constipation. Moreover, all the symptoms are aggravated by the menstrual molimen, especially if the flow be obstructed or scanty. A vaginal examination, made at an early stage, detects increased sensibility about the cervix as well as about the recto-vaginal space. After a short time the uterus is found quite immobile, with the roof of the vagina hard, and unyielding, and stretched, while, subsequently, the uterus and its appendages give the impression of being glued together into a kind of solid and sensitive tumor. Moreover, the uterus is either in part or completely displaced; perhaps only the fundus is drawn backwards and downwards, causing an irreducible retroflexion. When pus is formed the abscess may push the pelvic viscera almost anywhere. Suppuration, however, is much more infrequent than in pelvic cellulitis.

In the chronic variety the symptoms may be so slight as to pass away without their import being correctly diagnosed. The patient is thought to be hysterical, while her pains are vaguely said to be neuralgic. The results are serious, however, especially in causing uterine and tubo-ovarian disease or displacement, and in binding the different intra-pelvic structures together with coagulable lymph. Menstruation thus becomes attended with great suffering, while in the event of pregnancy an abortion is likely to happen, or failing this there will be considerable pain and more than usual sickness during the early months. The catamenia may, however, permanently cease, and then of course there will be irremediable sterility.

Terminations, &c.—The duration of pelvic peritonitis varies much in different cases; it may run its course in three or four weeks from the onset, or it may continue for even a few years. Supposing suppuration to occur and the pus to be discharged by the rectum, there will perhaps be a complete cure, but the opening may close although pus continues to be secreted, and

then there will be rigors, night-sweats, debility, pain, loss of appetite, &c., until the purulent matter again escapes. In these cases of long-continued suppuration, albuminuria (owing to amyloid degeneration of the kidneys) may by and by follow and ultimately prove fatal. So also the cachectic condition induced by pelvic peritonitis now and then causes tubercular phthisis.

Prognosis.—Seeing the dangerous nature of this disease in its early stages, as well as the grave results which will possibly follow it, the practitioner should be somewhat reserved in speaking of the result. Many cases recover completely, but often only after suffering from dangerous complications, and perphaps from several monthly relapses. Where the inflammation follows upon parturition or abortion the danger to life is considerable.

Treatment.—The important remedies are, perfect rest in bed, the administration of opium in doses sufficient to relieve pain, and the application of heat and moisture by means of large linseed poultices over the hypogastrium. Applications by the vagina had better be avoided, but if they be employed they must consist only of pessaries containing opium and belladonna. I have known even emollient injections increase the pain, while in one instance a cold vaginal douche is said to have rendered the peritonitis fatal. All aperients are to be forbidden, for though it is a misfortune to have fecal matter in the intestines, yet there is too much risk of aggravating the inflammation by the powerful action of cathartics. If the rectum be loaded, however, three ounces of warm olive oil with one of castor oil may be injected, and retained as long as can be conveniently managed. Where there is pain or difficulty in emptying the bladder, the catheter should be employed. The diet must consist of milk and broths, with raw eggs and refreshing drinks. Ice ought to be allowed, as it allays the irritability of the stomach. Unless there be suppuration alcoholic stimulants do harm.

After an attack of pelvic peritonitis care will be needed for some time to prevent any relapse. During the four or five subsequent menstrual periods the patient should remain in bed, since these occasions are always critical. Again, if there be any leucorrhœal discharge attempts are not to be made to check this by astringent injections or pessaries. Overfatigue is always to be guarded against. A well-made abdominal belt, by supporting the viscera instead of allowing them to press upon the pelvic organs, often gives considerable relief. Nourishing food, cod-liver oil, and a long stay at the seaside are valuable allies in getting a complete restoration to health.

3. PELVIC ABSCESS.—Suppuration occurs within the pelvis as a consequence of pelvic cellulitis with greater frequency than from any other cause. It may also happen from pelvic peritonitis, from inflammation of the walls of an ovarian cyst, or of an extra-uterine pregnancy, or of the structure of a fibroid tumor of the uterus, as well as from degeneration of the blood poured out in a case of hæmatocele.

Whatever the cause of the suppuration may be, the *symptoms* will generally be well marked. Thus, there are chills or distinct rigors; attacks of hectic fever, with night-sweats and sleeplessness; and pains about the pelvis, with great throbbing and tenderness. Bodily weakness and mental anxiety are marked features in these cases. Neuralgic pains extending down the thigh of the affected side are complained of, and pains about the sacrum are wearying. On making a vaginal examination, a sense as of touching a thin-walled cyst full of fluid will be communicated to the finger,

provided the abscess be pressed low down, and be not altered in character by the pressure of some fibroid or other tumor upon its walls. In a very few instances fluctuation can be detected by alternately quickly pressing and ceasing to press just under the pubic arch, while one finger of the other hand is applied to the swelling in the vagina. The uterus is also more or less fixed, and at times displaced. The abscess spreads in all directions, and there is scarcely any limit to the size it may possibly attain. I have removed upwards of two pints of pus from one abscess.

After a time the wall of the abscess may often be felt to be getting thin at one point, indicating the situation at which the contents will probably be evacuated. Although the pus is generally discharged into the rectum or into the upper part of the vagina, yet very rarely it makes its exit into the peritoneal cavity (setting up severe but not necessarily fatal peritonitis), or it is discharged into the bladder, or it burrows and makes its escape externally at one or other groin. Where the abscess opens into the rectum or vagina the sac may become obliterated and the patient soon get well. But, unfortunately, in not a few instances the matter is resecreted, to be once more discharged at the same spot as before; this process being repeated again and again, until the health becomes much reduced. Nevertheless, steady perseverance with proper remedies can often at last effect a cure; so that in no instance of this kind should the patient or the practitioner despair. The most troublesome cases to manage are those where the pus burrows and escapes at different times by different openings. In such, very obstinate sinuses remain which are healed with great difficulty; while if they communicate, as they ultimately are likely to do, with the bladder and rectum, a distressing state of disease will result. In this way there may be fistulous openings about the anus, vulva, groins, or lower part of the abdomen; through all of which offensive pus and urine and fluid fæces will be discharged. If one or two of the wounds close, they generally only do so for a time; or if we succeed in firmly healing some of the sinuses, it will probably be at the expense of aggravating the others. A lady who was under my care for nearly two years with small abscesses which burst into the rectum every six or eight weeks, unfortunately became pregnant before a thorough cure could be effected. The consequence was the formation of a large quantity of pus, which burrowed about the loose areolar tissue in all directions; while her sufferings were so great and constant that it became necessary to induce premature labor at the seventh month. Great relief followed the birth of the child, and under the influence of sea air and tonics, &c., the health improved considerably; but the sinuses never showed any disposition to heal, while the abundant irritating discharges which were poured from them produced, at length, fatal exhaustion.

The *treatment* of pelvic abscess has to be conducted on those well-recognized principles which guide us in the management of disease which has gone on to suppuration in other organs. There are few if any exceptions to the rule that nourishing food and wine and tonics are required. Good claret, or carlowitz, or tokay, or St. Elie (an excellent restorative Greek wine), or port, or brandy and soda-water, &c., may be prescribed, the choice of either of these depending on the state of the stomach as regards acidity and retching. Milk, cream, strong beef tea, soup, and jellies should be ordered; followed by white fish, mutton, poultry, game, roast beef, and so on, as soon as the stomach appears strong enough to digest animal food. With regard to drugs, no remedies are better than ammonia and bark (F. 371); for which quinine and one of the mineral acids (F. 379) had better be substituted at a later stage. Cod-liver oil does good if it can be assimi-

lated. Where the suffering is severe most relief will be given by the subcutaneous injection of morphia (F. 314). If there be peritonitis, opium in repeated doses ought to be trusted to.

Locally, soothing fomentations, hot and large linseed poultices, and repeated hot hip-baths will of course be had recourse to. The most important question, however, is as to the advisability of surgical interference, upon which point there is a difference of opinion. Some authorities recommend exploratory punctures, followed by incisions, where there is the smallest indication that pus is present. Others, on the contrary, assert that the abscess is not to be opened, but that it is to be allowed to burst spontaneously. My own experience leads me to acquiesce in the soundness of this last principle, unless the pus is evidently near the surface, as when there is pointing in one or other groin, or distinctly in the vagina, &c. There are many arguments which can be adduced in favor of the practice of non-interference. Especially it may be mentioned that in these cases the mutual relation of the pelvic viscera gets altered in proportion to the amount of swelling, so that it is difficult to say what textures may be wounded. Then the abscess may seem to point, and yet an incision at this site will possibly fail to reach the matter, while even by a successful puncture we cannot always prevent the formation of a counter-opening into the peritoneum or bladder. Moreover, when a part of the wall of the abscess has thinned to such an extent that an opening may safely be made, it is most probable that the work which has gone on so far favorably will still progress as satisfactorily without as with our meddling; while when the opening forms deliberately it will be less likely to heal too rapidly, than an incision with a bistoury or a puncture with a trocar. With the object of preventing the re-formation of the pus after the contents of the abscess have been evacuated it would seem advantageous, theoretically, to resort to pressure. To apply this efficiently, however, is by no means an easy task; while frequently there is so much tenderness that no pad and bandage can be borne. I have tried more than once to fit an india-rubber bag, filled with air, just above the pubes, maintaining pressure by means of a kind of truss-spring; but the apparatus could only be worn for a few hours at a time, and no benefit resulted.

4. CYSTS OF THE BROAD LIGAMENTS.—Thin and single membranous cysts, of variable size, are sometimes found attached to the broad ligament; or such cysts become developed between the layers of the ligament, or they seem to grow from the fimbriated extremity of the Fallopian tube. Probably the most frequent variety of cyst originates in the remains of one of the little tubules of the parovarium or Wolffian body. Such a cyst does not usually attain a greater size than that of the closed fist; although every now and then a larger one will be met with. Thus, in a case successfully operated upon by Mr. Spencer Wells, under the idea that the tumor consisted of a nearly unilocular ovarian growth, the cyst was proved to have its origin in the broad ligament, and to be about twice the size of an adult head. The ovary was healthy and in no way connected with the cyst.* It seems to me very probable that some of the cases of supposed unilocular ovarian tumors which have been cured by tapping, have in reality been examples of cystic disease of the broad ligament. The fluid from these cysts is transparent, free from albumen, and somewhat resembles limpid urine in appearance; while that from an

* Diseases of the Ovaries: their Diagnosis and Treatment, vol. i, p. 240. London. 1865.

ovarian tumor is always more or less albuminous, and is very seldom translucent. The removal, by abdominal section, of a cyst having its origin in the broad ligament can never be justifiable until simple tapping has failed to effect a cure. Even then it is unnecessary to do more than expose the cyst, empty it, and excise a small portion of its walls; so that any fluid which is afterwards secreted may escape into the peritoneum, whence it will become absorbed without exciting inflammatory or other serious symptoms.

5. PELVIC HÆMATOCELE.—The fact, that an effusion of blood may take place upon or beneath the peritoneum in the immediate neighborhood of the uterus and its appendages, has attracted much attention for some time past; for although a few examples of this accident may have been described upwards of two centuries ago, yet it was practically unknown until a comparatively recent date. The tumor formed by the effused blood is known as a *sanguineous pelvic tumor*, or as *ovarian apoplexy;* though it is now more commonly described under the designation of either *retro-uterine, peri-uterine*, or *pelvic hæmatocele* [Αἷμα = blood + κήλη = a swelling]. In France, especially, many valuable essays have been published on this disease since the year 1831, when Recamier gave the history of a case which had been under his care. It was not, however, until 1850 that Viguès attempted to collect and systematize the different features and symptoms presented by these sanguineous pelvic tumors; while to Dr. Tilt we are indebted for having, towards the end of 1852, first brought the subject before the profession in this country.

Causes.—Any condition which interferes with the normal performance of the menstrual function, and especially such as impedes the due discharge of this secretion, must be regarded as a prominent cause of pelvic hæmatocele. Hence this accident almost always occurs at a catamenial period: while it is most common about the age of 30, when the sexual organs are in their greatest vigor. The sudden suppression of the monthly flow, excessive mental excitement or bodily exertion during the period, intemperate coition, and external injuries, are likely to induce the form of hemorrhage under consideration. Dr. J. Byrne, of New York, believes that in 80 per cent. of the cases there will be found unmistakable evidence of ovaritis; which in time produces a varicose condition of the vessels, a softening possibly of the gland tissues, a modification of the nervous stimulus, and ultimately rupture with extravasation.

Pathology.—The disease consists of an effusion of blood into the peritoneal pouch between the uterus and rectum, or into the subperitoneal tissue behind and around the uterus. The latter is the least dangerous form, as the effusion is generally small; and therefore it may be wrong to infer that it is by no means of such frequent occurrence as the first kind, because post-mortem examinations rarely show its presence. According to M. Bernutz it is only met with during pregnancy or the puerperal state; but this opinion has not been confirmed by other observers. In the former or intra-peritoneal variety, the blood has now and then been discharged so abundantly as to fill the entire abdominal cavity; although more frequently the extravasation will be found limited to the recto-uterine cul-de-sac, being generally confined there by the effusion of coagulable lymph with the formation of adhesions. Hence the danger is decidedly greater in the non-encysted than in the encysted cases.

The blood may be poured out from various parts. Thus, it can escape from the ovary at the time of menstruation if this organ be diseased, or if it be the seat of inordinate congestion. It may come from one of the Fal-

lopian tubes, owing to the rupture of its wall; or in consequence of a reflux of the sanguineous exhalation which takes place from its mucous lining during a catamenial period; or it will happen as the result of a retrograde flow from the interior of the uterus when the os uteri is obstructed. Rupture of one or more of the vessels of the utero-ovarian venous plexus, or of a varicose vein in the broad ligaments, or of the vessels in the cyst of of an extra-uterine fœtation, has been its source. Hemorrhagic peritonitis will, perhaps, produce it, and so may that exhalation of blood which is sometimes met with in chlorosis, as well as in purpura and scurvy. And lastly, the effusion may be one of the effects of a general and excessive congestion of the reproductive organs, such as is the cause of some forms of menorrhagia, especially if this congestion have any connection with the hemorrhagic diathesis.

Symptoms.—The symptoms will vary according as the escape of blood is large or small. Where the flow is excessive, there will be indications of nervous shock, as well as of exhaustion from internal hemorrhage. The patient is suddenly seized with acute pain in the lower part of the abdomen; while there is chilliness or shivering, coldness of the extremities, vomiting, increasing feebleness of the circulation, and a ghastly expression of the countenance. The suffering resembles that produced by rupture of one of the abdominal viscera. Death usually occurs in the course of two or three hours.

In a second set of cases the loss is great but not inordinate. There is violent abdominal pain, tympanites, sickness, and chilliness followed by fever. A sense of pelvic weight is common, with bearing-down pains. The face becomes pinched and pale, and the countenance anxious. Sometimes, but by no means always, there is either difficult micturition with a frequent desire to empty the bladder, or a painful irritability of the rectum. If the catamenia be present at the time of attack they may suddenly cease, or the flow may continue unaltered, or the discharge may be greatly increased. On examining the lower part of the abdomen, a smooth and elastic swelling will be found in the hypogastric or iliac regions; while on introducing the finger into the vagina, a large tumor will be felt projecting into this canal. If the finger be passed onwards, the cervix will be discovered drawn upwards behind the symphysis pubis; but we shall not be able to trace the body of the uterus stretching backwards, as it can be detected in cases of retroversion. On examining by the rectum, the passage of the gut will be found more or less obstructed by the swelling which has been previously detected in the vagina.

The symptoms presented by a third class of cases resemble the foregoing, save that they are less acute. Possibly no tumor can be detected by an abdominal examination, though a well-marked vaginal swelling will be present. Most of these cases do well, although there is a fear of the peritonitis which ensues extending upwards, or of a second attack of hemorrhage setting in just as recovery is taking place from the first seizure.

To distinguish between intra-peritoneal and subperitoneal hæmatocele it may be remembered that in the former the tumor is generally higher (extends more up into the abdomen) than in the latter; while there is greater disturbance of the system, and a more rapid setting in of peritonitis in the peritoneal than in the extra-peritoneal form. It is rather remarkable, however, that little aid in arriving at a conclusion can be obtained from a vaginal examination; for although theoretically, it would seem probable that blood under the peritoneum would press against the vagina and uterus, and so cause displacement much more than an effusion into the peritoneum

could, yet in practice it is found that the same results ensue from the blood gravitating in the cul-de-sac between the vagina and rectum.

Diagnosis.—As the recognition of this disease is a matter of recent date, it follows that the symptoms it produces must formerly have been erroneously attributed to other disorders. Cases illustrative of such mistakes, occurring even since 1850, have been recorded; while probably before this time practitioners prided themselves on the correctness of their diagnosis when they classed examples of this affection under the heads of dysmenorrhœa, or of anæmia, or, perhaps, of those convenient refuges for the destitute, spinal irritation and hysteria. The chief diseases with which pelvic hæmatocele is likely to be confounded, are pelvic abscess, extra-uterine fœtation, retroversion of the gravid uterus, fibroid tumors of the uterus, and ovarian cysts.

Considerable difficulty will often be experienced by the most painstaking physician in distinguishing between pelvic abscess and an effusion of blood; for in each there may be local peritonitis, constitutional disturbance, and a pelvic tumor. But the peritonitis sets in after the formation of the tumor in hemorrhage, instead of preceding the suppuration; while the heat and tenderness about the vaginal walls are much less in the former than in the latter. Nevertheless, where the history of the case fails to throw light upon its nature, and it seems necessary to be exact, the diagnosis must be established by the use of a fine trocar and canula; just as we employ the exploring needle in doubtful growths at the surface of the body.

With regard to extra-uterine fœtation it may be remembered that the patient usually believes herself to be pregnant, and she experiences the usual symptoms of this condition. The menses have generally ceased. The practitioner is seldom consulted until the fœtus has acquired such a size that its presence can be determined; unless indeed rupture of the cyst takes place with abundant hemorrhage, and then the case as regards treatment may be mistaken for hæmatocele from other causes without any injury to the patient.

In retroversion of the uterus, the position of the os uteri under the pubes, and the possibility of tracing the body of the uterus thrown backwards, point to the nature of the accident. It would seem impossible to mistake a solid fibroid tumor of the posterior wall of the uterus for a blood coagulum, did we not know that in one instance an eminent surgeon made free incisions to enucleate a supposed fibroid, and only discovered his mistake too late; while on another occasion the autopsy disclosed the hæmatocele, though the case had been lectured upon as affording a good example of a common uterine tumor. An ovarian cyst could only be mistaken for a blood-swelling, if the former were small and were confined by adhesions to the peritoneal pouch between the uterus and rectum. An exploring-needle would remove all difficulty, if interference were demanded.

Terminations.—The patient may die outright from the severity of the nervous shock; or from the loss of blood where the hemorrhage is great, or where one attack of bleeding is followed by a second. The effused blood may become absorbed, and complete recovery follow. The blood will now and again be discharged into the bowel, and escape per anum; the ulceration between the blood-cavity and that of the rectum ultimately healing. It has been suggested by Dr. Willoughby F. Wade of Birmingham that a cure is sometimes effected by the effused blood finding its way through the Fallopian tubes into the uterus, and thence into the vagina; and he thinks that in those cases where it has been supposed that the escape has been by a rupture of the vaginal wall, that in reality the blood has

passed along the oviduct. The blood-cyst and its contents can undergo suppuration; recovery perhaps ensuing after protracted suffering and the discharge of sanious pus by the rectum, or death taking place from exhaustion. And lastly, the patient may die from the peritonitis which is set up by the effusion, especially where the inflammation spreads and involves the whole serous membrane.

Treatment.—In those formidable instances where the patient is apparently dying from the loss of blood, the only hope of saving life is from the free exhibition of stimulants and essence of beef, with full doses of opium.* The use of sinapisms to the extremities, and the application of bladders of ice to the lower part of the abdomen and the vulva may be of some assistance.

But fortunately these terrible cases are comparatively rare, and there is time to give the patient the benefit of a well-directed line of treatment. The most perfect repose in the recumbent posture must always be enjoined, however slight the effusion may at first appear; for without quietude all else will most likely be useless. Opium is to be administered, in doses sufficient to prevent faintness, as well as to relieve the pain. Ice should be continuously sucked to stop the vomiting, while a sinapism may be laid over the epigastrium for the same purpose. Supposing there is reason to fear that the bleeding is continuing, strips of muslin wrung out of cold water are to be laid over the lower part of the abdomen and vulva. If there be any difficulty in emptying the bladder, the catheter is to be employed; but unless the rectum be blocked up with fecal matter it will be better not to administer any aperient. With regard to the necessity for surgical interference, opinions differ widely. It seems to me, however, quite certain that if the case be progressing favorably, it will be wise to leave well alone; for it is infinitely safer, by gentle means, to do all that can conduce to a sure though slow recovery, rather than to risk the patient's life by any attempt at a rapid and brilliant cure. The effused blood will in most instances gradually be absorbed, just as certainly as we find those sanguineous tumors disappear which are occasionally developed between the bones of the skull and the pericranium in new-born infants. At the same time, if the symptoms produced by the pressure of the blood are very distressing, or if they are causing increasing prostration, then it may be advisable to puncture with a trocar the most prominent part of the tumor, either through the vagina or rectum. Moreover, if we have reason to believe that there is not only blood but pus present, then recourse can be had to puncture. Sometimes it has been deemed of advantage to leave

* The influence of opium in arresting hemorrhage and in sustaining life, when death seems imminent from loss of blood, is admirably described in an essay by Dr. W. Griffin (Medical and Physiological Problems, &c., p. 201, London, 1845). The writer shows that after severe uterine hemorrhage, when the countenance is sunk, when the eye is hollow and glassy, when the lips are blanched, when the skin is cold, when the heart-beat is scarcely perceptible and the whole person is corpse-like, when brandy and rectified spirits are vomited or have no influence, there is still one remedy capable of restoring life, and that is opium. Death from hemorrhage is not so much owing to mere debility of the heart's action, as to loss of nervous power in the brain consequent upon it. The opium stimulates the heart, while it restores a sufficient degree of tension in the vessels of the brain to prevent faintness. But this drug must be given fearlessly, and in conjunction with warm wine or brandy. In extreme danger five grains of opium should form the first dose; while two or three grains may be repeated in an hour, and again as necessity arises, until the pulse becomes distinct, the breathing easier, and the tossing or flinging about in bed is allayed. It is a singular fact that in similar states of debility, induced by acute or chronic disease, or by other causes than hemorrhage, opium is useless.

the canula in the wound, or to introduce a gum-elastic catheter, so as to prevent too early cicatrization; while several authorities recommend the frequent injection of small quantities of tepid water to prevent putrefaction of the retained clots. These are proceedings, however, which I should be very loath to adopt. But whether an operation be performed or not, the treatment of pelvic hæmatocele, after the subsidence of the acute symptoms, ought to consist in the administration of bark with one of the mineral acids, in carefully avoiding exercise or excitement at too early a period, and in the use of a very nourishing diet. Especially should the patient's condition be watched at the two or three succeeding monthly periods; so that by keeping her very quiet throughout the flow, we may guard as far as possible against any undue congestion of the sexual organs.

VI. DISEASES OF THE FALLOPIAN TUBES.

The difficulty of recognizing morbid states of the oviducts during life is considerable. Many of these states too are frequently not primary diseases but secondary; being such as result from pressure exerted by uterine or ovarian tumors, or by cancerous infiltrations of some of the pelvic viscera. Consequently the symptoms will usually be anomalous, and far from easy to interpret. The chief diseases of these tubes are inflammation, and stricture or occlusion leading to dropsy. The tubes may also become dislocated or displaced, passing (probably in company with the ovary) through the inguinal or femoral openings. Thus, a tumor extending from the inguinal region to the right labium has been found to contain the Fallopian tube of the same side. A fatal case of femoral rupture has also been reported where the sac contained the tube alone.

1. INFLAMMATION OF THE OVIDUCTS.—Although the Fallopian tubes may undoubtedly be attacked with acute or with chronic inflammation, I must confess that I have never been able to diagnose such affections. And it is very probable that the symptoms produced by them so closely resemble those set up by pelvic cellulitis and ovaritis, that they will generally be attributed to one or other of these diseases.

According to most authorities, the principal indications of *acute inflammation of the tubes*, or *salpingitis* [from Σάλπιγξ = a tube; terminal *-itis*], are deepseated pelvic pains, with throbbing and tenderness about one or both groins; a sense of bearing down on assuming the erect posture; together with heat of skin, a dry tongue, constipation, and rapidity of the pulse. In the *chronic* form, the secretion from the lining membrane is much increased; so that if the uterine orifice of the tube be patent there will be a leucorrhœal discharge. In rare instances, the morbid action has ended in ulceration or in suppuration; the pus accumulating in the tube like an abscess, if the uterine extremity of this tube has been rendered impervious. Under such circumstances, death has occurred from peritonitis set up either by the pus regurgitating into the sac of the peritoneum, or by its leading to perforation of the walls of the canal.

2. TUBAL DROPSY.—Dropsy of the Fallopian tube is rather an uncommon affection. The fimbriated extremity of this canal, together with the uterine orifice, occasionally gets obliterated from the action of chronic

inflammation, or from the pressure of various pelvic tumors. In such a case the portion of the tube between the openings is very apt to become the seat of an accumulation of pus or of serous fluid; and instances are recorded where an hypertrophied Fallopian tube has alone weighed seven pounds, and has contained twenty-three pints of fluid. The diagnosis of this disease from a simple ovarian cyst is exceedingly difficult, and can only be guessed at in most instances. We can make sure the affection is not uterine where we find an elongated and yielding and fluctuating tumor at the side of the uterus, while this latter organ is able to be separated from the swelling by using the sound. In the museum of the Royal College of Physicians is a preparation, presented by Dr. Francis Hawkins when physician to the Middlesex Hospital, illustrative of dropsy of both Fallopian tubes; the extremities of these canals being all closed. The Hunterian Museum also contains a preparation (No. 2643) showing a section of a womb having a fibrous tumor in its fundus, and with the fimbriated extremity of one Fallopian tube turned round and closely glued to the side of the uterus; so that in consequence of the closure of both extremities of the tube, fluid has collected in the canal and distended it into an elongated pyriform sac.

The treatment of tubal dropsy, where the suffering is sufficiently severe to require interference, consists in puncturing the cyst with a minute trocar and canula through the roof of the vagina. Medicines given with the intention of producing absorption are quite useless.

The Fallopian tube may probably become distended with *blood* in cases where the escape of the menses is prevented by an imperforate os uteri, or by some obstructive disease about the vagina. The menstrual fluid being partly produced by the lining membrane of the oviducts, it must distend these tubes when its onward flow is impeded. After the distension has reached a certain point, it is very probable that the blood will escape at the fimbriated extremities of the tubes; and dropping into the peritoneal cavity, will thus give rise to peri-uterine hæmatocele.

VII. DISEASES OF THE UTERUS.

The greater number of women in this country begin to menstruate between the 14th and 16th year, the time at which this phenomenon is manifested being spoken of as the age of puberty. Not unfrequently a girl will menstruate once about the time she is 14, and then see nothing more for eight or twelve or fifteen months, after which all will go on naturally. For rather more than thirty years the flow recurs every twenty-eight days, calculating from the beginning of one period to the commencement of the next, while the duration of each period varies from three or four to seven days. Between the age of 45 and 48 years the discharge finally ceases, the date of this cessation being known as the last menstrual climacteric, or the change of life. Sometimes this occurs five or six years earlier, owing to some shock to the system. Thus I have known a permanent cessation take place at 37, in consequence of an attack of typhus, the patient nevertheless enjoying good health and continuing strong at 65. I have seen the same thing happen at the age of 32, as the result of a severe attack of rheumatic fever with endocarditis. Doubtless other disorders affecting the whole system now and then act in a similar manner.

During the years which intervene between the age of puberty and the change of life, there are few diseases of the generative system which are not attended with more or less disturbance of the catamenial functions, and hence either deficient, or painful, or profuse menstruation may become an important symptom of local change of structure. Independently of this, however, disordered menstruation may depend entirely upon a constitutional disease, the generative organs being healthy; while, again, other cases are met with where the uterine organs appear healthy and the general health good, and yet there is some imperfection in the manner in which the menstrual functions are performed.

As just mentioned, the period of sexual vigor (that in which woman may be said to be in a fit condition for childbearing) lasts for a little over thirty years. During this term the female system, both in health and disease, becomes considerably modified by the performance of the function of menstruation, and therefore, in treating either the general or the peculiar disorders of women, this circumstance should be borne in mind. And it can easily be understood, that if this is the case when the catamenia appear naturally and regularly, how likely it is that any disturbance of this process will give rise to a troublesome complication. The effect of the menstrual molimen is felt by the whole system, but especially does it influence the uterine and ovarian organs when diseased, often proving a source of anxiety while the attempt is being made to cure such affections. Moreover, this menstrual influence renders many of the disorders of the sexual system very tedious, the congestion which precedes and accompanies the flow always aggravating structural mischief for the time.

1. AMENORRHŒA.—Three distinct classes of amenorrhœa [from Ἀ = priv. + μήν = a month + ῥέω = to flow] have to be described: (1) The cases where no menstrual fluid has ever been secreted. (2) Those where there has been a secretion of the menses without any evacuation of them. And (3), the menses having appeared naturally, their return has become interrupted, or they have been prematurely suppressed, perhaps never to return.

The *first* form of amenorrhœa is not very often met with. In some cases there has been no menstrual secretion, because the patient has not reached the age at which the discharge will appear with her. For although the age of puberty mostly occurs between the 14th and 16th year, yet in many instances this does not happen until three, four, or even five years later. Of course such cases of retarded menstruation are no more to be considered as examples of permanent amenorrhœa, than is the occurrence of late dentition in infants to be regarded as a perpetual absence of teeth.

But when a female has reached adult life, when her frame has assumed the character of womanhood, when she is not chlorotic, and when all her organs (save the sexual) perform their functions naturally, then a cause for the absence of the flux should be looked for. Most frequently there will be found some congenital malformation. The ovaries are perhaps absent, or, as more frequently happens, they retain their rudimentary condition—that is to say, they would be found, if they could be seen, to present scarcely a trace of Graafian vesicles. Or these glands can exist and the uterus be absent, or so imperfectly developed as to be useless. Or again, the external parts of generation (the labia, nymphæ, and clitoris) may be natural, and yet there can be found neither a trace of a vagina, nor of uterus, nor of ovaries.

Occasionally the most complete examination will fail to detect anything

wrong with the uterus or ovaries. This is the case in a patient who has been under my care since February, 1855. At the present time (February, 1869), she is forty years of age, robust, and apparently healthy, and has been married seventeen years. The catamenia have never appeared, there is no sexual appetite, and there has never been any pregnancy. Yet the external organs of generation are fully developed, the vaginal canal is healthy, while the uterus is of normal size and movable, and naturally placed. The uterine sound passes readily for $2\frac{1}{2}$ inches, and I have attended her for attacks of ovaritis, in which the enlarged glands could be distinctly felt through the vagina. About every eight or twelve weeks—much less frequently now than formerly—there is a menstrual effort, severe pelvic and abdominal pains setting in, with considerable gastric irritability. The pain is at times agonizing, being only comparable to that set up by the passage of a renal or hepatic calculus, while it lasts, in spite of narcotics, for three or four days. Sometimes, but not always, these attacks are followed by a leucorrhœal discharge,—a discharge which many might term a vicarious menstruation. There has never been any symptom of hemorrhage into the peritoneum (pelvic hæmatocele), though the probability of such an accident happening during these menstrual molimina has not been overlooked.

Although it is most important for the well-being of women that menstruation should take place naturally, yet it must not be forgotten that the sanguineous discharge constitutes only a part of the process. It cannot be doubted that the uterus and ovaries may be healthy, that a mature ovule may be discharged monthly from a Graafian vesicle, and that the ovule may enter the uterus, while yet there may be no flow of blood from the uterine mucous membrane. The fact of pregnancy occurring in cases where there has never been any sanguineous loss, must be regarded as a proof that this latter part of the menstrual phenomena is not indispensable to the regular accomplishment of the generative functions. Equally true is it, that an excessive flow of blood towards the sexual organs can produce hemorrhage, without the occurrence of ovulation. I believe that not a few of the examples of very early menstruation which have been recorded, have been nothing more than cases of uterine hemorrhage; the discharge having had no more connection with menstruation, properly so called, than if the bleeding had taken place from the nose.

In the *second* variety of amenorrhœa there has been a secretion of the menses but no evacuation of them. Cases of this kind have already been spoken of in the section on occlusion of the vagina. But this canal may be healthy, while the os uteri is imperforate; owing to which condition the menses will accumulate in the uterine cavity, the latter gradually enlarging as in pregnancy. Now in examining these cases, care must first be taken to ascertain that the patient is not really pregnant; for the uterine orifice may have become closed from the occurrence of inflammation and ulceration after fecundation has occurred. Several examples of complete occlusion from this cause have been recorded; the inflammation having been sometimes excited by attempts on the part of ignorant persons to produce abortion, or by the use of caustics to heal ulcerations upon the labia. Moreover, disease may be set up in the cervix by a difficult labor; and then intercourse taking place before cohesion between the sides of the os uteri has happened, pregnancy has followed while the disease has also progressed.

Supposing, however, that the diagnosis is clear, and that there is a menstrual accumulation, an outlet for the latter must be made. When the os

is merely closed by a membrane, this structure may be incised with the bistoury, or it can perhaps be ruptured by the uterine sound. Generally, the occlusion is more perfect; and then, if it be possible to detect any spot or dimple, where the orifice should naturally exist, it will be advisable to carefully perforate this part with a proper trocar and canula. As the menses drain away, and for some time subsequently, care must be taken to prevent the opening thus made from closing; and this is to be done by daily using a bougie, or by occasionally introducing a small sponge or sea-tangle tent (F. 426). Moreover, if the uterus be large, a compress and binder had better be applied to the abdomen directly after the operation. On the other hand, an incision or puncture will be properly made, and yet the fluid cannot be reached; either because the enlarged uterus is too far from the vulva, or because there is no proper connection between the womb and the vagina. Then again, there are cases where the vagina is not only wanting, but it does not seem feasible to attempt the formation of such a canal. Under any of these circumstances, in order to prevent rupture of the uterus, this organ will have to be opened through the rectum; this unsatisfactory procedure being adopted with the precautions already (p. 750) noticed.

There remains to be considered the *third* and by far the most common form of amenorrhœa; viz., that in which the flux having been properly established, and having appeared regularly for a longer or shorter time, becomes prematurely arrested.

This form of suppression may occur suddenly, while the discharge is on, owing to some mental shock, or to the setting in of a severe fever or other acute disease, or in consequence of exposure to damp or cold. On the other hand the amenorrhœa may take place gradually,—that is to say, without any apparent cause, the menses will not come on at the expected time, though they were natural at the previous period; or the flow may become less and less for several periods, and then entirely stop. There is usually more constitutional disturbance in cases of abrupt or acute, than of chronic suppression; but the latter is most to be feared, as it is generally indicative of a more serious cause. With this form of amenorrhœa we sometimes have a variety of sympathetic ophthalmia set up. The conjunctiva gets congested, &c., at the time of the menstrual flow being due. Supposing the latter comes on, relief is experienced; but otherwise, the conjunctivitis continues and does not complete its course for some six or seven days. In almost all cases of phthisis, occurring in women during the period of sexual vigor, there is disturbed menstruation. Sometimes, as the disease is setting in, I have had to use astringents to check an excessive flow; but as a rule, the history is that of a gradual lessening of the secretion, until by the time that the tubercular deposit has begun to soften, there is complete amenorrhœa. The same course of events can be noticed, though less constantly, in affections of the kidney producing albuminuria; as well as in many other diseases which tend to induce anæmia. Moreover, inflammation of the ovaries or uterus may inflict so much structural mischief as to stop menstruation. And lastly, the occurrence of suppression in consequence of pregnancy must not be forgotten; nor should we overlook that temporary cessation which sometimes occurs for the two or three periods following upon marriage, and which leads the woman to suppose herself pregnant when the amenorrhœa is only due to excessive excitement.

With regard to the treatment of suppressed menstruation, the mitigation or removal of the cause should be the practitioner's first aim. Then, if

there be any menstrual effort, this should be encouraged, and if not, attempts ought usually to be made to induce it. Where the prominent symptoms are those of general plethora, much good may be done by administering purgatives, selecting such as will unload the congested liver while they excite the uterine organs. A mixture of nitric acid and taraxacum and senna (F. 147), or of aloes and senna and sulphate of magnesia (F. 150), or of gamboge and aloes and blue pill (F. 174), or of podophyllin and aloes (F. 422) will often serve this double purpose. These medicines should be particularly given as the time for the period approaches; and then if there be no flow, from three to six leeches may be applied to the lips of the uterus by means of the speculum. Enemata of hot salt water often do good. Sea-bathing, or cold hip-baths, or mustard pediluvia will also deserve trial. Plenty of exercise should be taken on foot or even on horseback. A light and unstimulating diet had better be ordered.

Instead of the system appearing plethoric, however, the indications are much more frequently those of anæmia. Under these circumstances, the general health is to be improved; and no drugs are generally more useful than those which contain some preparation of steel. The patient is on no account to be purged; but if there be constipation a daily evacuation may be procured by giving steel in combination with aloes (F. 154, 393, 404). Stimulating diuretics sometimes prove serviceable—particularly the spirit of nitrous ether, and the spirit of juniper or common gin. The other remedies deserving of recollection are the iodide of iron (F. 32), strychnia and steel (F. 408), savin and steel (F. 421), oil of rue and ergot (F. 422), stimulating foot-baths, hot hip-baths, vaginal injections of warm water, galvanism, &c. I have no faith in galvanic pessaries (intra-uterine stems formed of parallel bars of zinc and copper) for any form of amenorrhœa, but on the contrary believe they may produce much more mischief than can arise from the condition they are meant to relieve. The use of the waters at Spa (F. 467), Ems (F. 486), Schwalbach (F. 488), Eger (F. 498), &c., may be recommended under certain circumstances. The diet ought to be nourishing, care is to be taken that the food is properly assimilated, and some light wine or beer must often be allowed. Exposure to damp and cold is to be carefully guarded against; while the body should be warmly clothed, having flannel next the skin.

With regard to those cases where the suppression is a part only of some severe disease, *e. g.*, phthisis, Bright's disease, &c., attempts to bring back the discharge will only prove injurious. It has always seemed to me, that the cessation of the flow in such cases is really conservative; while its spontaneous return may be taken as evidence of a general tendency towards improvement.

2. DYSMENORRHŒA.—The woman who enjoys perfect health not only menstruates regularly, but she does so free from any suffering. There are very few, however, who pass through the whole period of sexual vigor without more or less frequently having to endure an attack of dysmenorrhœa [from $\Delta υς$ = difficulty + $μήν$ = a month + $ῥέω$ = to flow]. Some few females experience great pain with each flow, from the commencement of puberty until the change of life; while in others, pain is only an exceptional accompaniment. With some women marriage effects a cure; while in others (especially where there is sterility) it either aggravates or originates dysmenorrhœa. Whether this pain have its seat in the uterus, or ovaries, or pelvic peritoneum, or in the pelvic connective tissue, is often difficult to determine. Three distinct varieties of dysmenorrhœa have to be considered, viz., the neuralgic, the congestive, and the mechanical.

1. *Neuralgic dysmenorrhœa* seems most frequently to afflict young nervous women, in delicate health at the time of puberty; or it comes on after some ten or twelve years of painless menstruation, especially in those who have never been pregnant.

The suffering usually commences a day or two before the period, with a feeling of malaise, headache, and pain about the sacrum and lower region of the abdomen. The upper and inner parts of the thighs become tender, the surface of the abdomen feels sore, and a sense of weight or bearing down about the pelvis is complained of. Suppose the discharge then comes on at all freely, relief is generally experienced; but more commonly there are only slight gushes, or the flow is scanty, and the suffering becomes so severe that the patient is obliged to keep in the recumbent posture. If she obtain a few hours' ease, she is in fear of the pain returning; experience having taught her that a short respite may be followed by a violent paroxysm. It is probable that the ovaries are more the seat of this neuralgic pain than the uterus; though the bearing down may be due to the irritability of the os and cervix uteri, being analogous to that troublesome straining and frequent desire to go to stool which is so constantly present in diseases of the rectum. On making a vaginal examination, during the intervals, only negative information will be obtained. The parts are neither swollen nor hot, and even on pressing about the ovarian regions little or no tenderness may then be complained of. The effects upon the system are seldom well marked. Yet the patient without being ill can scarcely be said to be well. She is sometimes hysterical, is apt to suffer from flatulence, and nausea, and constipation, has frequent attacks of headache, is chilly, and often labors under fits of mental depression.

The cure of neuralgic dysmenorrhœa is almost always tedious. To relieve the pain just before the flow comes on, the hot hip-bath should be employed; the patient remaining in it for from thirty to forty-five minutes. The addition of an ounce of carbonate of soda with the same quantity of extract of poppies to the water, renders it more soothing; while this good effect can be best kept up by the use, immediately afterwards, of a pessary of oxide of zinc and belladonna (F. 423). Where the pain continues severe, some other narcotic will also be needed; and recourse may be had to a mixture of Indian hemp and ether, &c. (F. 342), or to one or two grains of the extract of opium with a glass of hot gin and water, or to the hypodermic injection of morphia (F. 314).

During the intervals between the periods the general health must be improved, and the nervous system strengthened. Such tonics as bark and phosphoric acid and aconite (F. 376), quinine and one of the mineral acids (F. 379), salicin with some bitter infusion (F. 388), or the hypophosphite of soda and sumbul (F. 419), often prove very serviceable. Cod-liver oil (F. 389) is frequently useful. Supposing there to be any evidence of gout or rheumatism being connected with the pain, the remedies for these diseases will have to be recommended. So if the patient has been exposed to the influence of malaria, large doses of quinine or of arsenic will be called for. If there be constipation, mild laxatives may be prescribed,—compound rhubarb pill, the effervescing citrate of magnesia, a teaspoonful of taraxacum juice in a tumblerful of cold water, or simple enemata. A cupful of chamomile tea, taken early every morning, not only acts as a tonic and stomachic, but will probably also serve to keep the bowels regular. The diet is to be nourishing, milk or cocoa being substituted for tea and coffee; a regulated quantity of wine, or of weak brandy and water, or of bitter ale, may usually be allowed. Country air and outdoor exercise, early hours, interesting pursuits, and warm clothing, are all-important aids

in forwarding recovery. With married women, it is better to forbid sexual intercourse for a few weeks—possibly ten or twelve; and then should pregnancy happen, the cure may be regarded as accomplished. During the period of rest, if there be persistent tenderness about the ovaries the belladonna pessaries already recommended should be used every night, or every other night. Under these circumstances also, chlorate of potash and bark will often agree remarkably well.

2. *Congestive dysmenorrhœa*, sometimes described as inflammatory dysmenorrhœa, generally occurs at a later time of life than the neuralgic form. The cause of this variety may be simple congestion with irritability of the uterine lining membrane; or the symptoms will be found connected with endometritis, or ovaritis, or pelvic cellulitis, &c.

The suffering commences, or is greatly aggravated, four or five days before each period; while it may continue, with more or less interruption, for a week. Complaint is especially made of nausea, backache, weariness and restlessness, and a sensation of weight about the pelvis. Frequently the patient also suffers from hæmorrhoids, with now and then more or less prolapsus of the rectum; while she is annoyed with repeated flushings, and there is often severe throbbing pain about the uterus. The discharge comes on very gradually; and as for the first day or two it is usually scanty, so it fails to relieve the suffering. But when the flow becomes more abundant, the distress gets mitigated; though there are often paroxysms of pain, as small clots and shreds of membrane get expelled from the uterine cavity. These shreds of membrane are of variable size; occasionally consisting of large flakes, and at other times of small pear-shaped sacs which constitute complete casts of the cavity of the uterus. Such casts are smooth and polished on their internal, and rough and villous on their external surfaces; their continuity being broken at certain parts, showing where the orifices of the os uteri and Fallopian tubes have existed. They consist of the epithelial lining of the uterus, being analogous to the decidua. The epithelial coat of the vagina is sometimes thrown off under the influence of inflammation, as has been previously mentioned (p. 754).

If a vaginal examination be made in the interim between the periods, the cervix uteri will generally be detected congested and tender, the lips will be often seen excoriated, and there will be found pain on pressing the ovaries. There is usually an abundant and tenacious leucorrhœal discharge. Sometimes also there is uterine displacement; the bladder or the rectum being irritable according as the womb is anteflexed or retroflexed. In other instances the uterus is merely found lower in the pelvic cavity than it should be, owing to its being heavier than natural. Frequently the breasts swell and become very tender; the tumefaction and pain increasing as each period approaches, but never entirely subsiding during the interval.

The remedies recommended for the relief of the pain in neuralgic dysmenorrhœa seldom fail to afford considerable alleviation in the form under consideration; but where they seem inefficient, and where the discharge does not come on at the proper time, the application of three or four leeches to the lips of the uterus will be serviceable. Not unfrequently I have been able greatly to mitigate the suffering by scarifying the œdematous uterine lips directly the increased uneasiness and pain have indicated that the period is approaching.

Throughout the interval attempts must be perseveringly made to effect a cure. The patient should live plainly, avoiding stimulants. She should take out-of-door exercise without inducing fatigue; but long country walks,

dancing, and riding on horseback, are to be forbidden. So long as dysmenorrhœal membranes come away, pregnancy is scarcely possible; and in such cases it is always better that sexual intercourse be avoided. As helping to produce a more healthy condition of the uterus and ovaries, while relieving the backache and bearing-down and the vesical or rectal irritability, I would recommend the steady employment of the iodide of lead and belladonna pessaries (F. 423). And then, if the disease be associated with the gouty or rheumatic diathesis, or if it have its origin in a syphilitic taint, as I am sure it sometimes has, the proper remedies for these affections must be resorted to. It is in such cases especially that warm sea-water baths, colchicum, iodide of potassium, cod-liver oil, and mercurial vapor baths, succeed in restoring health, when other remedies have failed, and the patient has almost become disheartened.

3. *Mechanical dysmenorrhœa* is that form in which there is some obstruction to the free escape of the menstrual discharge. Hence, there are more or less violent expulsive pains, coming on in paroxysms—uterine tenesmus. The causes of the obstruction are various. There is either a stricture of the internal orifice of the uterus, or a narrowing of the whole canal of the cervix; or the external os uteri is abnormally small and contracted; or there is some uterine tumor, interfering with the patency of the cervical canal; or there is a malposition of the uterus, such as retroflexion or anteflexion, bending the uterus and giving to it the form of a common retort.

On the present occasion, I shall only treat of those cases where the dysmenorrhœa is due to stricture of the internal or external os, or to narrowing of the entire cervical canal. And believing as I do that this variety of painful menstruation is far from uncommon, that it gives rise to very considerable suffering at the periods, that it is one of the most frequent causes of sterility, while at the same time it is very amenable to proper treatment,—believing all this, I shall not distract my readers with the different opinions which gentlemen entertain on these several points. For here, as in other departments of uterine pathology, there is much disagreement; the views of obstetric physicians as to the proper management of many of the cases which fall under their observation varying as widely, as we find those of other practitioners to do when they speak of the treatment of acute inflammation, of the use of stimulants, of glaucoma and iridectomy, of stricture of the male urethra, of the resection of joints, or even of the comparative value of lithotomy and lithotrity.

The symptoms produced by contraction of the cervical canal are such as indicate an obstruction to the escape of the menstrual fluid. There is usually a scanty flow. Often the discharge escapes in gushes instead of oozing drop by drop through the os uteri, each gush being preceded by a bearing-down effort and accompanied by an expulsive pain. The stomach is irritable, so that there are attacks of nausea and retching, with flatulence and perhaps constipation; while there is always severe backache, often irritability of the bladder, and frequently congestion with tenderness of the ovaries. The narrowing will either be congenital, or it may be the result of an attack of endometritis. On making an examination, the os uteri will be seen very small, perhaps not larger than a common pin's head; or it may be of the natural size, the stricture only existing at the internal os, through which the uterine sound cannot be introduced without considerable difficulty. Sometimes the contraction is so great that we are unable to pass the sound at all, or it can only be made to enter for about an inch or less. In such cases we must either wait for the end of a menstrual period,

or relax the tissues by the application to the uterine labia of three or four leeches before again using this instrument.

The treatment required in these cases consists in so permanently widening the cervical canal that the menses may pass away without difficulty. The question is, how to do this efficiently and with the least risk? Many physicians recommend gradual dilatation; and they effect this either by bougies, sea-tangle or sponge-tents, or by the introduction of instruments with expanding blades which are specially made for the purpose. Now there is one great objection to this practice—not that it is painful, for all local interference causes more or less suffering; not that it is apt to be followed by pelvic cellulitis, for there is a liability to this in whatever way the uterus may be handled,—but that it does not effect a permanent cure. For to whatever justifiable extent the stretching may be carried, the contraction will certainly return; unless, indeed, pregnancy should fortunately occur directly the course of treatment is over. If we take a piece of india-rubber, shaped and perforated down its centre so as to resemble the uterus, and then daily introduce a larger and larger bougie along the roughly-made passage, leaving the instrument in for ten or fifteen minutes on each occasion, we shall succeed in forming, by the end of a month, just as great a canal as we can do in the case of the cervix uteri by the same means. A piece of caoutchouc does not more certainly contract after extension, than does the fibro-muscular structure of the nulliparous uterus. It has happened to me to have to dilate, with sponge-tents, a virgin cervix for the removal of an intra-uterine polypus. Six weeks after the extraction of this growth, which was the size of a small orange, the contraction of the cervix had become so great that the sound could be only introduced by employing a little force; although there had been no inflammatory action, and the cure had been effected without an untoward symptom. But I might speak nearer the mark, and adduce instances where I have perseveringly tried dilatation in these cases of contraction, and where the result has been most disappointing to the patient and myself. Suffice it, however, to say, that nothing which I have read, and nothing which I have done, can lead me to advocate this practice.

Some years since (about 1847) Sir James Y. Simpson recommended the incision of the narrowed uterine canal by means of the hysterotome. Of course, this operation has been deemed perfectly unjustifiable; while sad pictures have been drawn of the results which have followed its employment. Nevertheless, among the many improvements in practice which we owe to Professor Simpson's great skill, I believe there are few for which we ought to be more grateful than for this. The hysterotome invented by this gentleman is well known. It is indeed only a concealed knife, the sharp edge of which can be made to protrude to a regulated extent by pressure upon a spring; but as there is only one blade, it has to be applied first to one side of the cervical canal and then to the other. In using it, there is a fear also that the incisions may be made too deeply, and hence that severe hemorrhage will arise from wounding the circular arteries which are found in the neighborhood of the internal os. To obviate these inconveniences, a very ingenious curved double-action hysterotome has been constructed by Mr. Coxeter, under the direction of Dr. Routh; and I have pleasure in saying that this instrument answers its purpose admirably. The blades are protected, so that the instrument is introduced like the uterine sound, passing it upwards until the lips of the os rest upon the broad shoulder; and then by pulling down the handle from the sheath, the blades are made to open and expand, producing a limited and uniform cut surface as they descend.

The way in which, then, I now treat these cases of contraction is as fol-

lows: The patient is placed upon her left side, in the ordinary position for labor, with her legs drawn up and the body curved. The bowels have been previously well acted on. Chloroform is seldom needed. The sound is passed to render the canal more patent, as well as to make sure that there is no abnormality, except the stricture; and then the hysterotome is introduced, without using the speculum, and the incisions being rapidly made, the instrument is withdrawn. Having been taught by experience that severe bleeding is apt to follow this operation, I always take steps to prevent it; either by employing one of Dr. Greenhalgh's spring stem pessaries which compresses the cut surfaces, or by plugging. To do the latter properly, it is necessary to introduce the speculum; through which I first pass a long strip of oiled lint completely up the whole length of the cervix, and then push up pellets of cotton-wool into the vagina so as firmly to plug this canal. The only inconvenience which results from the employment of the plug is, that micturition is most times impeded, so that the catheter has to be employed; but to counterbalance this, the patient can be left with the conviction that she is safe from bleeding. The plug, thus introduced, is usually left undisturbed for forty-eight hours; and then, after its removal, I insist upon the strictest quiet being maintained, not even allowing the patient to sit up in bed, lest hemorrhage should come on. The following day I introduce the uterine sound, well covered with lard; for it must be remembered that no operation will answer in these cases, unless we adopt measures to keep the incisions open. After thus using the sound on two or three days I introduce a slight and curved uterine stem, which has been made for me by Mr. Coxeter; and this the patient is allowed to wear, unless it be badly borne, for several weeks. She leaves her bed and walks about while the stem is in the cavity; although, of course, she is watched at intervals, so as to guard against any attack of inflammation. Very rarely (much more seldom indeed than after the employment of sponge-tents) symptoms of pelvic cellulitis have set in; but the prompt use of hot hip-baths, medicated pessaries, and opiates, has always checked the mischief. I do not remember having met with any case where the inflammation has gone on to suppuration, under these circumstances. Moreover, the operation has never proved directly or indirectly fatal in my hands. I have been thus minute in describing this proceeding partly on account of its importance in regard to the cases under consideration, and partly also because, as will appear further on, it is a valuable operation in some of the other diseases to which the uterus is liable.

3. MENORRHAGIA.—To the remarks already made on this subject (p. 94) it may now be added that by excessive menstruation is frequently meant either a more abundant escape than is natural to the subject of it, or a prolonged flow, or a recurrence of the sanguineous discharge at short intervals—sometimes so short that the patient says she is constantly unwell. As a rule to which there are many exceptions, the first variety depends upon undue uterine and ovarian congestion, set up by constitutional causes; the second is also caused by some general influence, or it is induced by slight disease of the uterus or ovaries; while the third (more correctly spoken of as metrorrhagia or uterine hemorrhage) is generally significant of the presence of some organic disease.

Now, with regard to uterine hemorrhage, it is scarcely necessary to say, that the effects upon the system will vary with the extent of the loss. In most of the instances which have come under my notice these effects have been but too well marked. Thus, the patients have been pallid and feeble, unable to go through any exertion, low-spirited, and restless at night; they

have suffered from loss of appetite and constipation; there has been more or less irritability of the stomach, as indicated by frequent attacks of nausea and sickness; and occasionally I have found considerable œdema of the lower extremities. In severe cases, the bloodless aspect of the patient, and the attacks of syncope which have followed on any attempt to assume the upright posture, have sufficed to show the alarming condition to which the sufferers have become reduced.

Such being the troublesome and dangerous symptoms which may arise from protracted or frequent attacks of flooding, it appears very important that we should have some rule to guide us in their treatment. And it seems to me, from a careful observation of many cases, that some such law as the following may be laid down: That when a woman suffers from repeated attacks of uterine hemorrhage, which can only be partially or temporarily relieved by the use of rest, nourishing food, and proper astringents, we may be sure that there is some organic disease of the ovaries or of the uterus. If of the former, one or both of the glands will be found enlarged or tender on making a vaginal examination; if of the latter, the same proceeding may at once afford either positive or only negative evidence. By positive evidence is meant that there will be discovered simple or malignant ulceration of the cervix; or a polypus or other tumor projecting at the os uteri, or lying in the vagina; or an inversion of the uterus; or a morbidly patent os uteri, the consequence of cervical endometritis. The value of negative evidence is, of course, difficult to appraise. Still, although the os uteri may only be of the normal size and free from any excoriation, and though the cervix and body may feel healthy to the touch, yet we can be certain that the bleeding is due to some actual disease —that it is not functional. I would say, under such circumstances, that it is in all probability caused by one of the following conditions: either by malignant disease confined to the fundus uteri, by an unhealthy pulpy condition of the mucous coat, or by the growth of fungoid vegetations on this coat; by some dead or diseased product of gestation retained within the uterine cavity, or by the presence of a polypus, or of a fibroid tumor. The first of these causes is so rare that it need not be allowed to enter into our calculation, inasmuch as, after some research, I am inclined to think that half a dozen specimens of cancer confined to the fundus are not to be found in the whole of the pathological collections of the London hospitals. With regard to the remaining causes, there is only one plan of treatment which can be adopted with a reasonable hope of success, and that is to dilute the os and cervix thoroughly with sea-tangle or sponge-tents (F. 426), so as to permit of the removal of the source of the evil. For it matters not whether there be disease of the lining coat of the uterus, a dead ovum, or a tumor, so far as the production of hemorrhage is concerned; while with regard to the two latter conditions, at least, nought but removal can lead to an effectual cure.

4. UTERINE CATARRH.—The mucous membrane lining the uterus, like that of other cavities, will now and then become affected with catarrhal or croupy inflammation. This condition, accurately defined by the term endometritis [from Ἔνδον = within + μήτρα = the womb; terminal *-itis*], is attended with one prominent symptom—a tenacious mucous discharge; and hence the disease is commonly spoken of as *uterine catarrh*, or *uterine leucorrhœa*.

Causes.—Whatever irritates the uterine mucous membrane is apt to set up inflammation in this tissue. Hence it is never met with before puberty, though it is by no means rare afterwards. The most common cause of en-

dometritis is the too frequent occurrence of pregnancy, especially when one gestation after another ends in abortion. Polypi within the uterus, as also intra-uterine fibroids, will set up a low form of inflammatory action. Congestion of the uterus may terminate in inflammation of the lining membrane; and in this way exposure to cold and wet, excessive sexual excitement, &c., must be mentioned as causes. Contact with an unhealthy secretion from the male urethra will often induce inflammation; or vaginitis, however originated, can give rise to it when the morbid action travels upwards. Endometritis occasionally occurs as the consequence of a morbid state of the blood. Thus, it is sometimes a manifestation of a syphilitic taint; it may happen during the course of the eruptive fevers; and it has been also observed in cases of typhus and typhoid fever, of cholera, of dysentery, &c. Just prior to the menstrual period a state exists very much resembling that of catarrhal inflammation; and unless there be sufficient vitality to produce rupture of the vessels and the consequent natural discharge, the inflammatory action will very probably persist and uterine leucorrhœa supersede or become vicarious of the catamenia. This is a condition often met with in delicate young women for two or three periods after the first menstruation, constituting the *menstruæ albæ* of old authors; while it is very common in cases of chlorosis, in the anæmic condition which is present during convalescence from severe disease, &c. About the change of life, moreover, a mucous discharge from the uterus not uncommonly takes the place of the menses for a few periods before their final cessation.

Pathology.—The inflammation may be acute or chronic; while it is either limited to the mucous membrane of the cervix, or that of the body and fundus of the uterus will likewise be involved. Not unfrequently the morbid action is confined to the lining membrane of the body of the womb.

Where the affection is acute (acute catarrhal endometritis) the whole structure of the uterus seems to be more or less spongy and congested. The lining membrane is rendered intensely red, œdematous, and softened; while occasionally there are small and scattered patches of extravasated blood. The tubular follicles become somewhat turgid and prominent. The mucous membrane is also easily scraped or separated in shreds or laminæ from the subjacent tissues, while now and then it comes away as a complete cast of the uterus. Although at first this membrane is unnaturally dry, it soon pours out a thick tenacious discharge; which subsequently becomes muco-purulent, and often more or less tinged with blood. The more the cervical portion of the mucous membrane is involved, the more tenacious and gummy will be this discharge; which then imparts a starched greenish-yellow or a yellowish-red stain to the patient's linen. The lips of the cervix are often swollen, while they exhibit patches of excoriation or one large abrasion.

Chronic catarrhal inflammation presents a condition analogous to that which is seen in chronic nasal catarrh; that is to say, we have an irritable membrane, œdematous in some parts and excoriated in others, secreting an abundant glairy mucus resembling the white of egg. There is no active congestion; but the membrane is spongy, and is often thrown off in small flakes. The discharge is seldom tinged with blood. Acute endometritis sometimes runs its course in ten or fifteen days, and the morbid action entirely ceases; but much more commonly it insensibly passes into the chronic form, when a most troublesome and obstinate disorder gets set up. In consequence of it there may occur a kind of fungous degeneration of the uterine mucous membrane; in which we find this structure more or less studded with little sessile growths, or with minute vegetations like follicular polypi. Such a degeneration keeps up the catarrhal secretion, while it is also a frequent cause of metrorrhagia. According to some authors, endometritis

may cause glandular and cystic growths; while even fibrous polypi or tumors will result, if the proliferations of the mucous membrane go on to a sufficient extent.

Symptoms.—In the *acute* variety there are certain general symptoms always present. Thus, we find more or less feverishness, general irritability, a sallow complexion, and loss of appetite; pain about the lower part of the abdomen, the sacrum, groins, and upper part of the thighs; a feeling of heat and fulness in the pelvis; a sense of bearing-down, which is relieved by the recumbent posture; and a frequent desire to pass urine, this secretion being loaded either with urates or uric acid. At first, also, there is often diarrhœa and tenesmus; but in a few days the bowels may become just as much confined as they were previously relaxed. Hæmorrhoids are not uncommonly present: at times there is prolapsus of the bowel. The ovaries and uterus are always very tender on pressure, while an internal examination shows that the latter organ is congested and augmented in volume; but when, about the third day, a secretion takes place from the mucous membrane, this tenderness and congestion begin to diminish, while we find the os uteri patulous and the cervical canal dilated.

The chief symptoms of the *chronic* form are the abundant catarrhal discharges, and the painful derangements of the menstrual functions; while there are also obstinate disturbances of the digestive functions; backache, headache, lassitude, and a slow loss of strength. For a long time the patient is neither ill nor well, and though she gets low-spirited, yet she ofttimes tries to persuade herself that there is nothing wrong. After the discharge has continued for some weeks, it begins to tell upon her health; while her sallow appearance, loss of appetite, and incapacity for any mental or bodily exertion begin to alarm her friends.

Now although there is much difficulty in saying where the acute process terminates and the chronic commences, yet it is much easier to ascertain from the symptoms whether the morbid action be confined to the mucous membrane of the cervix, or whether that of the body and fundus be also involved. For in the latter case, the disease not only appears to be more generally severe, but it has a peculiar tendency to set up hysterical or convulsive affections, to induce frequent attacks of nausea and tympanites, to make the breasts tender and swollen, and to cause menorrhagia. Moreover, in endometritis of the fundus, a digital examination provokes much more abdominal and pelvic pain than is complained of when the inflammation is limited to the cervix; while in the former the introduction of the uterine sound causes much local suffering, and often brings on an attack of hysteria, or even an epileptiform seizure. In both, the withdrawal of the sound is followed by a glutinous and often sanguineous discharge, the latter, perhaps, persisting for two or three days; while also in both forms, ulceration, or at all events, excoriation is set up about the lips of the womb, probably through the irritation caused by the acrid discharge. When the disease is limited to the cervix, the uterine cavity generally remains of its natural size.

Chronic endometritis is an occasional cause of vaginitis, of vulval pruritus, of ovarian irritation, of menorrhagia, of abrasion of the labia uteri, of stricture of the canal of the cervix, of contraction of the os uteri, and of sterility. The persistence of an abundant purulent discharge for many months must greatly injure the general health; and consequently it now and then happens that these cases lead to tubercular disease of the lungs, or to amyloid degeneration of the liver or kidneys, or other important structures.

Diagnosis.—The symptoms of acute endometritis are so characteristic

that this disease can scarcely be mistaken for any other. After the disorder has been present for some time, in a chronic form, there may be some little difficulty in distinguishing between it and chronic vaginitis. The discharge in uterine catarrh consists of an alkaline plastic fluid, containing mucus and pus corpuscles, fatty matter, casts of the tubular follicles, and perfect with disintegrated cylindrical epithelium. In vaginal catarrh the white or creamy-looking secretion is made up of an acid plasma, with fatty particles, mucus and pus cells, and tessellated or pavement epithelium. On other points, attention to the remarks made at p. 754 will help to prevent the practitioner from committing any error.

Treatment.—The management of the *acute* form is chiefly resolved into ordering complete rest in bed, a diet of fish and milk and mucilaginous drinks, remedies to alleviate uterine congestion and pain, as well as in regulating the bowels. At the commencement, a dose of calomel and compound jalap powder (F. 159) often acts very beneficially. A warm hip-bath night and morning, where there is no hemorrhage, should be prescribed; while the injection of hot water with a siphon syringe, as the patient sits in the bath, gives considerable relief. At night a pessary of mercury and belladonna (F. 423) may be introduced into the vagina; and if there be much tenderness at the lower part of the abdomen hot linseed poultices ought also to be applied. If the symptoms do not appear to yield, and if there be no menorrhagia, the application of from four to six leeches to the lips of the uterus can be recommended. It would seem unnecessary where there is so much pain and tenderness to forbid sexual intercourse; but remembering that women with even uterine cancer will sometimes submit to connection, it is better to be explicit on this head. I have seen patients nearly well from an attack of endometritis have all their sufferings reproduced by sleeping with their husbands. Moreover, the uterine discharges in these cases are very likely to excite severe inflammation of the male urethra.

The *chronic* variety runs a tedious course which it often seems impossible to influence. Frequently, advice is not sought until the disease has existed some time; or perhaps inefficient treatment is adopted, the case being regarded as one of hysteria. Speaking generally, the two remedies from the simultaneous employment of which I have found the most benefit are mercury and cod-liver oil. With regard to the first, we have several preparations to choose from. In very obstinate cases, the green iodide of mercury (F. 53), or the red iodide (F. 54), or even Donovan's triple solution (F. 51), will prove useful; but a prolonged course of the corrosive sublimate with sarsaparilla (F. 27) often suffices, and is usually better borne than the other kinds. Sometimes it has seemed more efficacious to employ iodide of potassium (F. 31), while the mercurial and belladonna pessaries have been introduced into the vagina. It is difficult to explain the action of the cod-liver oil, but of its efficacy I have no doubt. The use of pepsin (F. 420) will often aid its digestion. Where there is evidence of much congestion about the uterus and its appendages, leeches may be applied once or twice a week to the labia; but in the absence of this symptom, local depletion is often more powerful for harm than good. Moreover, when there is anything like menorrhagia, leeches are of course unnecessary. The instances in which they prove most useful are those where, with congestion, we find considerable narrowing of the os uteri; but here it is often a better practice to divide the constricted mouth with the hysterotome (p. 781), more especially where the patient is married and is anxious to have children. For it must be remembered, that not only is endometritis a cause of

sterility, but by producing constriction of the cervical canal it may render the woman barren after she has been completely cured of the inflammation.

Where the symptoms indicate that the mucous membrane of the body and fundus is involved in the inflammation, I believe that the introduction of remedies into the uterus will only aggravate the mischief. If there be any exception to this rule, it is when the disease has become very chronic and all tendency to convulsive affections has passed off. But in cervical endometritis considerable assistance may often be derived from the application of astringents to the diseased membrane. Hence the solid nitrate of silver can be passed up the canal, or the latter may be swabbed with a piece of cotton-wool dipped in a concentrated solution of perchloride of iron; or a stick of tannin and cocoa butter, or of sulphate of zinc and the same material, or of mercurial ointment and cocoa butter (F. 424) may be advantageously used. The cases which have been recorded of death from the use of intra-uterine injections, have prejudiced me against the practice of throwing fluids into the uterus; and certainly such remedies ought never to be employed, unless the os uteri be rendered so patulous by the previous use of sea-tangle tents that the injection can readily flow away while the small tube of the syringe is in the orifice of the womb. Counter-irritation by means of blistering fluids, or the actual cautery, or potassa fusa applied to the lips of the cervix, is productive of good in very tedious cases.

It only remains to add that the diet in chronic cases must be nourishing, animal food and milk and raw eggs being useful. Stimulants need not be forbidden, with the exception of malt liquors. Gentle exercise in the open air does good; a daily drive in an open carriage being especially serviceable. When the discharge has entirely ceased, the necessity for further treatment is generally at an end; but if the system appear deficient in tone, the cod-liver oil should be continued, while one of the mineral acids with bark (F. 376) had better be administered. The officinal sulphate of beberia, in doses of five grains thrice daily, often does great good under these circumstances. I am generally averse to the employment of steel until the recovery has been complete and of some duration; but if there be depression, and other circumstances will permit of it, a visit to the baths of Spa (F. 467), Homburg (F. 491), Carlsbad (F. 496), Marienbad (F. 497), or Kissingen (F. 493), can be advantageously recommended.

5. INFLAMMATION OF THE UTERUS.—Inflammation of the substance or parenchyma of the unimpregnated uterus is undoubtedly a very rare disease. When it occurs, either the muscular tissue of the body will be alone affected; or the morbid action will be confined to the cervix; or, as more frequently happens, the whole of the parenchyma from the os to the fundus will be involved. When the inflammation ends speedily in resolution, the lining membrane generally escapes.

Causes.—Acute metritis [from *Μήτρα* = the womb; terminal *-itis*] may result from the sudden suppression of menstruation before that congestion of the uterus and its appendages which is present at each period has been sufficiently relieved. In this way, exposure to cold, great fatigue, excessive mental excitement, and intercourse with violence may induce it. Occasionally, the irritation set up by a fibroid tumor in the uterine walls has been the starting-point. The extension of the inflammation in endometritis is also possible, as well as that in simple or gonorrhœal vaginitis. But probably the most frequent cause is mechanical injury; such as may be inflicted by the careless use of the uterine sound, by the abuse of powerful caustics, or by rude and criminal attempts to bring about abortion at an early period of pregnancy.

Puerperal metritis is not a very uncommon disease; but it has little or no resemblance—either as regards its symptoms, or grave importance, or the treatment it requires—with the non-puerperal variety now under consideration.

Symptoms.—An attack of metritis may set in suddenly with rigors followed by feverishness, though ordinarily it comes on gradually. Complaint is made of a feeling of fulness and weight, of irritation and heat throughout the pelvis. There is an unpleasant sense of throbbing, with tenderness, about the pubes and groins and perineum. The bladder is irritable, there is often nausea with vomiting, while there may be diarrhœa with tenesmus. And then, at the end of twenty-four or thirty-six hours, the uterus becomes the seat of considerable suffering; acute paroxysms of pain coming on at short intervals. With these attacks of pain there is usually a copious purulent or tenacious muco-purulent discharge, although sometimes there is a flow of blood. If a vaginal examination be made, the mouth of the uterus will be found patulous, while the lips are puffy; the body appearing heavy, hot, congested, and exceedingly sensitive. The canal of the vagina often seems to be shortened (partly because the uterus falls lower than it does in health), and its walls are œdematous. The bloodvessels also, about the cervix and upper part of the vagina, can be felt pulsating with considerable force. Moreover, great pain is experienced on making pressure downwards into the pelvis, through the lower part of the abdomen. The patient keeps in the recumbent posture and often with her knees drawn up; for sitting erect increases the pain and throbbing, as well as the irritability of the bladder and rectum.

The acute symptoms generally subside in from five to eight days. In favorable cases the inflammation gets resolved, and no ill effects ensue. But occasionally, the disease leads to the formation of one or more abscesses in the parenchyma of the uterus; or it may give rise to hypertrophy of the uterus, with induration of the labia, abrasions, and subsequent menstrual irregularities with obstinate leucorrhœa, &c. In very exceptional instances, there is fatal gangrene; or a form of subacute inflammation is set up, which will very probably extend to the pelvic connective tissue (pelvic cellulitis), or to the peritoneal investment of the womb (pelvic peritonitis).

Diagnosis.—This disease can scarcely be mistaken for any other if all the symptoms be fairly considered, and if an internal examination be resorted to. The only fear is that the practitioner may fail to make the latter, from his attention being exclusively devoted to the gastric or intestinal irritation. The uterus is not fixed as it is in pelvic cellulitis and peritonitis; while in addition to retaining its mobility, it is more individually the seat of tenderness—there is less diffused pelvic pain, than is the case in inflammation of the uterine connective tissue or of the serous coat. The patency of the os uteri, the swelling of the body of the womb, and the abundant purulent discharge, all point to inflammation of the parenchyma as the cause of suffering.

Treatment.—During the acute stage complete rest in bed, a simple diet with cooling drinks, and hot hip-baths are required. After the patient has sat in hot water for half an hour, she can usually bear the introduction of the speculum without much pain; so as to allow of the application of four or five leeches to the lips of the womb. The bites should be encouraged to bleed, for a short time afterwards, by filling the speculum with warm water; and then when the redness and fulness of the cervix seem to have diminished, the instrument is to be withdrawn and a medicated pessary, especially one consisting of opium and belladonna (F. 423),

introduced into the vagina. If the paroxysms of pain continue severe in spite of these remedies, the same practice should be resorted to on the following day. But usually it will suffice to continue the baths, and to have a pessary used each night for some five or six times. The gastric irritability will seldom require any special attention; though supposing it to do so, the use of a sinapism to the epigastrium, with the frequent sucking of small lumps of ice, will prove efficacious in controlling nausea or retching. Where the evacuations cease to contain fecal matter, and consist almost entirely of mucus, the irritability of the bowel should be decidedly checked by an opiate enema or suppository (F. 339, 340).

In chronic cases the engorgement and induration will be best removed by the use of iodide of potassium with bark, by cod-liver oil, by a nourishing diet, and by the employment of pessaries containing iodide of lead and conium. Unless the general health be maintained, the treatment will be useless. Where the cervix remains much hypertrophied and indurated, it will often be advisable to rub down the hardened tissue with a stick of caustic potash. For this purpose, a glass speculum (and I may here mention, that in the treatment of uterine disease I very rarely employ any other instrument than the excellent one devised by Sir William Fergusson), sufficiently large to admit the cervix uteri into its extremity, is to be introduced into the vagina; the patient lying on her left side, with the knees drawn up. The mucous membrane over the labia is then to be destroyed with a hard pencil of caustic potash; taking care, by frequent mopping with cotton-wool, that none of this deliquescent corrosive runs down between the labia and speculum into the vagina. Having made an eschar of sufficient size on one or both lips, the latter ought to be well washed with equal parts of vinegar and water, then covered with oil, and the speculum withdrawn. Three or four days afterwards the parts are to be examined; when, if necessary, the operation should be repeated. In this way, two or three applications will often suffice to remove a state of induration which would be unaffected by any milder measures. The patient had better remain in bed for a day or two after each cauterization; while she is to persevere with the general remedies already mentioned. If there be any suspicion of the presence of a syphilitic taint, the solution of corrosive sublimate (F. 27) ought to be taken steadily for several weeks.

6. ULCERATION OF THE CERVIX.—As a frequent result of congestion and inflammation of the parenchyma of the vaginal portion of the cervix uteri, or of the mucous membrane covering it, we meet with various forms of ulceration. Many cases which are regarded as examples of irritable uterus, of so-called leucorrhœa, or of menorrhagia, have their symptoms produced by abrasions or ulcerations about the labia and cervix.

The most simple and most frequent condition which is met with consists of *abrasion* or *excoriation* of the uterine lips; with or without eversion and disease of the lower part of the mucous membrane of the cervical canal. In this affection, the epithelium is removed from a part of one or both lips; the exposed villi with their looped capillaries conveying a characteristic "velvety" feel to the touch. The abrasion is usually most marked at the edges of the uterine orifice, while it often extends for some little distance up the canal of the cervix. Sometimes the erosion is so superficial that it is difficult to say whether there is more than intense congestion present; but any doubt which may be entertained on this head can be readily solved —as suggested by Dr. Henry Bennet—by lightly touching the suspected surface with nitrate of silver. On doing this, the abraded surface assumes a much whiter tint and a more coarse appearance than the region which is

simply congested, while the limits of the denuded portion become well marked. These excoriations are of no little importance, inasmuch as they tend to keep up cervical and ovarian congestion, and thus to cause menstrual irregularities—often shown by attacks of menorrhagia; while the pelvic and sacral pains which the disease produces irritates the patient, and the constant leucorrhœal discharge ultimately gives rise to considerable weakness. At times this discharge is tinged with blood, especially after intercourse or any exertion. Should the general health become much affected, an abrasion may degenerate into a troublesome ulceration; such an occurrence, however, being far from common.

Now, although there can be no doubt that these abrasions are frequently the result of some general derangement of the system, yet I believe that they are not to be cured by constitutional remedies alone. The treatment must be *local* and *general*. With regard to the *first*, considerable benefit will ensue from the use of two or three leeches, or from scarifications of the labia, where there is much congestion. Then, alum or zinc vaginal injections (F. 425), or astringent and sedative pessaries (F. 423), should be employed; or, if the woman be married, there can be no objection to the occasional application, through the speculum, of the solid nitrate of silver, or of what often answers better—the undiluted solution of subacetate of lead. In some obstinate cases, gently dabbing the excoriated surface with a pellet of wool moistened with the acid solution of nitrate of mercury, proves very efficacious; but this caustic must be applied most sparingly, since it exerts a powerful influence both locally and generally. I have seen it frequently produce tenderness of the gums, lasting for two or three days; while once or twice it has even caused salivation. Moreover, after the use of this escharotic, as of any other, I would advise the practitioner to thoroughly smear the cauterized tissue with oil or lard; a suggestion so simple that I should hesitate to make it, had not experience taught me how much such a practice adds to the comfort of the patient. Supposing there to be any eversion of the mucous lining of the cervical canal, the foregoing practice will greatly help to cure it. I have never yet seen a case where it has been necessary to pare the edges of the cervical fissure and bring them together with silver wire sutures, although I have heard of this practice being recommended.

The *general* treatment of these cases is by no means so simple as might be imagined. Even as regards the daily mode of life, opinions vary greatly; some practitioners confining the patient to the sofa and bed, while others insist upon her taking horse exercise and long walks. Both extremes, however, are equally injudicious. It seems to me better to allow the usual avocations to be quietly pursued, provided no injurious habits have been contracted. The diet should be nourishing, with a proper supply of animal food and milk; while if stimulants be needed, a little claret, or sherry, or champagne, or weak brandy and water, will be found preferable to malt liquors. The digestive organs ought always to claim attention, though I would warn the practitioner against resorting to over-active remedies. Granting that abrasion of the uterus, as a local disease, has been the favorite hobby-horse of some physicians, still it is certain that others have found as rampant and mischievous a steed in the same affection when saddled with torpidity of the liver. Dyspepsia is common in these cases, but the stomach only requires gentle aid. Such agents as pepsin (F. 420), quinine and rhubarb (F. 178), oxide of silver and rhubarb and ipecacuanha (F. 179), or the nitro-hydrochloric acid in some bitter infusion (F. 378), are much more valuable than calomel, antibilious pills, black draughts, &c. Generally the system is depressed, and small doses of quinine (F. 379), or

especially of salicin (F. 388), improve the appetite and tend to give tone. Supposing any alterative is needed, arsenic in combination with iodide of potassium or with quinine (F. 52), will deserve a fair trial. Where cod-liver oil can be digested, and especially if the case be under observation during cold weather, this agent often proves very serviceable. I have spoken somewhat at length on the subject of treatment, because the remedies here recommended are useful in all ulcerations (save those of a specific nature) which occur upon the cervix.

The term *ulceration* is applied to those cases where the uterine lips are not only more or less deprived of their dense epithelium, but where the villi with their vascular loops are also destroyed in patches. Every now and then it happens that the proper tissue of the uterus is involved; the process of molecular gangrene occasionally running on to such an extent, as ultimately to remove a considerable portion of the cervix.

A simple ulcer on the lips of the uterus is generally of an irregular shape, its edges are seldom well defined, and it presents an uneven granular aspect. The tissue around the orifice of the womb is often involved; and the ulceration extends up the cervical canal, from which a quantity of glutinous mucus can be seen exuding. The vaginal portion of the cervix is also found much congested, and perhaps covered with a thick muco-purulent secretion. Where the ulcer is deep, it is usually coated with a grayish slough; the congestion is great, so that an examination may produce rather free bleeding; dilated varicose veins can frequently be seen ramifying about that part of the neck which is not involved; and the muco-purulent discharge is abundant. The congestion attendant upon ulcerations of the cervix not only extends to the body of the uterus, but to the Fallopian tubes and the ovaries. Hence there is much general uneasiness about the pelvis, sometimes burning pains are complained of, and attacks of menorrhagia are common; while there is a troublesome sense of bearing-down and weight, with backache. The general symptoms are those of anæmia with deficient nervous power. Headache is common, there is often neuralgia, the skin is of a dirty sallow hue, and the pulse is feeble; while the appetite is bad, the tongue is furred, and the bowels are irregular. As the patient feels weak, so she is indisposed to make any exertion; and as she finds the bearing-down and pelvic weight increased by walking or sitting up, she prefers keeping to the sofa. The breasts, bladder, and sometimes the rectum, are likewise apt to suffer from reflex irritation.

The remedies required are much the same as those recommended for the cure of abrasion. Local bloodletting, however, is less frequently called for, since the ulcerated surfaces usually bleed freely. Care must also especially be taken not to allow the leucorrhœal discharge to accumulate in the vagina; cleanliness being insured by the employment, night and morning, of warm water or astringent injections. If the ulceration be deep, the gentle application of caustic potash, or of the acid solution of nitrate of mercury, will be required. No remedies relieve the reflex irritations so effectually as the pessaries of iodide of lead and belladonna.

Primary syphilitic sores are rarely met with on the cervix or labia uteri. Still more infrequent are they on the walls of the vagina. When they have existed in either of these situations, they have seldom been detected until carefully sought for, owing to the bearer having inoculated one or more men with the poison. Chancres so placed are usually single, and very seldom accompanied by any external sore. Ricord mentions a case in which there was (on one uterine lip) a round ulcer with well-defined and

sharp edges, and an ash-colored surface surrounded by a red areola or border; which doubtless was syphilitic, inasmuch as two persons contracted chancres from it. Sometimes the chancre is concealed within the canal of the cervix; so that in any suspicious case, where an abundant muco-purulent discharge is seen issuing from the os uteri, and where one or both lips are much injected, the edges of the opening should be gently everted with a couple of long probes. It is by no means improbable that many cases of concealed chancre have been regarded as examples of gonorrhœa in the first instance; while perhaps such, when presenting secondary symptoms, have gone to swell the list of patients who have manifested constitutional symptoms without having had any primary sore. A true Hunterian chancre on the uterus has the same tendency to spread and to infect the system as one elsewhere, and it requires similar constitutional and local treatment.

Secondary syphilitic affections of the uterus are by no means uncommon. They are very obstinate, and will now and then persist as the sole remains of the syphilitic poison. The chief symptoms are considerable enlargement and increased firmness of the vaginal portion of the cervix; an abundant muco-purulent (or purulent) discharge, both from the cavity of the uterus as well as from the walls of the vagina; with patches of abrasion, or even superficial ulcerations, upon the labia uteri. Now and then the induration and excoriation are so extensive that the case is mistaken for cancer; an error, however, which will seldom be committed if attention be paid to the general state of the system, and if it be noticed that the uterus is perfectly movable—not fixed as it is in malignant disease advanced to the stage of even superficial ulceration. The functions of the sexual organs are affected in constitutional syphilis; so that menstrual irregularities are frequent—the flow being usually too abundant. There is also evidence of morbid changes in other parts of the body; particularly loss of hair, sore throat, scaly cutaneous eruptions, and nodes upon the tibia or upon the frontal bone. Should a woman thus affected become pregnant, she will either abort, or she will be delivered (probably prematurely) of a dead child, or she will give birth to an infant who will soon exhibit proofs of a contaminated system. One or other of these results will follow again and again until a radical cure is effected. The cases we read of sometimes of abortion from habit are in nine cases out of ten abortion from constitutional syphilis. The treatment of this disease must be carried out according to the principles already (p. 278) laid down.

Rodent ulcer of the uterus is a severe disease, which has often been confounded with epithelial cancer. The general characters of this peculiar ulceration have already been described in the chapter on diseases of the vulva (p. 736).

Rodent or corroding ulcer of the os uteri is rarely, if ever, met with before the age of thirty; while in the greater number of cases it seems to have commenced about the time of the cessation of the menses. The ulceration begins very gradually, and extends slowly. As it eats away the affected tissue, complaint is made of pelvic heat and discomfort, with backache or pain about the hips; and there is a thin serous discharge, occasionally streaked with blood. The patient becomes pallid, weak, irritable or anxious, and perhaps thin; while she suffers from indigestion and constipation, from occasional attacks of nausea, and from sleeplessness. After a time, a burning pain often sets in, though it is seldom severe: the suffering altogether, as a rule, being less intense than is experienced in cases of cancer. Attacks of moderate hemorrhage are not uncommon; sometimes consti-

tuting the earliest prominent symptom of the disease—or at all events that one which first leads the patient to seek advice. On making a vaginal examination, we shall probably find an irregularly-shaped ulcer with ragged or indurated edges; the sore being more or less excavated, and presenting a dry and glossy or a pulpy surface. The parts adjoining are neither indurated nor unhealthy; while the uterus is movable instead of being fixed as in carcinoma. Sometimes the whole of the cervix around the os is removed; the destruction of tissue having proceeded to such an extent as to produce a large pulpy cavity, into which the finger readily enters without causing pain. The disease, moreover, eats its way upwards into the body of the uterus, instead of extending downwards; so that the vaginal canal generally remains healthy. Ultimately the entire muscular structure of the uterus may be destroyed; though generally death occurs from exhaustion, or peritonitis, or even from hemorrhage, before this stage is reached.

The diagnosis of rodent ulcer from malignant disease will seldom be difficult, if we bear in mind that in the former there is simply destruction of tissue; whereas, in the latter, we find not only ulceration, but also an infiltration of cancerous matter into the affected part and the surrounding textures. It is chiefly owing to this infiltration that the uterus becomes fixed, and that the walls of the vagina get thickened so as greatly to diminish the calibre of this canal. Moreover, in rodent ulcer there is no affection of the lymphatic glands; neither is any deposition of morbid material to be discovered in distant organs.

The treatment is very unsatisfactory; partly because the disease is remarkably intractable, and partly for the reason that advice is seldom sought until the ulceration has made considerable progress. During the earliest stage, when the cervix alone is affected, excision of this portion of the uterus would probably afford a greater hope of cure than any other proceeding; but at a later period this operation is out of the question. The strongest escharotics have been employed, and almost universally they have proved useless. In fact, we are seldom able to do more than soothe the ulcer with sedative vaginal injections (F. 425), or with pessaries containing opium and belladonna (F. 423); while we attempt to improve the general health by a nourishing diet, by tonics, by cod-liver oil, and by sedatives, to remove the sleeplessness. As I believe that I have found benefit from the administration of arsenic (F. 52) in rodent ulcer of the cheek, I would recommend a trial of this remedy when the disease has its seat on the cervix uteri.

7. ELONGATION OF THE CERVIX.—The cervix uteri can be divided into two portions, viz.: that part which projects into the vagina, and that which is situated above this canal. Consequently, as M. Huguier has shown, longitudinal hypertrophy of the cervix may be confined to the intra-vaginal portion; or the supra-vaginal part will be alone affected. With regard to the latter I shall merely observe that it is a condition seldom met with save among laundresses, and women whose occupations entail much standing or walking; that it occurs for the most part in those who have had large families; and that it gives rise to the symptoms which accompany prolapsus of the uterus. It is also often combined with cystocele or rectocele. The os uteri is frequently more dilated than in health; while the sound will be found to penetrate for four, five, or more inches. As I am far from convinced of the necessity for the severe cutting operation recommended by M. Huguier, I would advise the practitioner to be content with palliating the symptoms. Rest for a few weeks, followed by remedies which give tone locally and generally, ought to be tried—such

treatment, in short, as the reader will find described in the remarks on prolapsus uteri.

Longitudinal hypertrophy of the vaginal portion of the cervix is attended with a feeling of pelvic weight and discomfort, tenderness on sitting down, and leucorrhœa. There is usually pain during coition, and conception is prevented. On examination, the vagina will be found in its normal position, but more or less filled by the elongated cervix, which part also projects at the vulva. The patient complains either that she has a tumor, or that there is a falling of the womb. If the sound be introduced it will pass readily for perhaps some five inches. Sometimes one lip is more prolonged than the other, but in the worst cases the whole of the vaginal cervix has become equally lengthened.

Amputation of the cervix constitutes the only effectual remedy. To avoid both primary and secondary hemorrhage it is better to employ the écraseur rather than the knife or scissors. In applying the chain of the instrument around the cervix, care must be taken not to wound the bladder, which viscus can hardly be injured if its upper limit be ascertained with the catheter. So, also, by not drawing the womb downwards, and by adjusting the chain about a quarter of an inch in front of the union of the vagina with the cervix, the risk of cutting into the posterior peritoneal cul-de-sac will be removed. Subsequently, as the wound heals, the sound should be introduced every third or fourth day, so as to prevent undue constriction of the os uteri.*

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* As this operation is not a very common one, I append here short notes of the only cases in which I have resorted to it:

Case 1. S. J., aged 42, single, a laundress in the Temple, had suffered so much from a supposed falling of the womb for two years, that she was unable to do her work. I saw her in consultation with Mr. Brooks, of Fleet Street, on October 23d, 1861. On examination, a greatly hypertrophied cervix was discovered, the uterine sound passing for five inches. The catamenia were regular and healthy: there was copious leucorrhœa. On October 26th Mr. Brooks administered chloroform while I slowly removed about two inches of the cervix with the écraseur. Not a drop of blood was lost. On November 23d she called upon me, the wound being healed. The sound passed for two and a half inches.

Case 2 In February, 1863, I saw a lady suffering from elongation of the cervix, who had frequently consulted me for attacks of ovaritis. She was 32 years of age, had been twice married, and had only been pregnant once, her child being eight years old. At the hands of other gentlemen she had been salivated, and the cervix had been repeatedly painted with iodine. On March 4th I removed the cervix with the écraseur. Chloroform was given by Mr. Reed, Assistant Surgeon of the Grenadier Guards. She returned home in good health on April 14th. Eight months subsequently she suffered from pelvic abscess, which discharged and then re-formed on three or four occasions. A cure was ultimately effected towards the end of 1864. When seen in 1869 she was found to have continued well.

Case 3. Mrs. W., aged 62, married 40 years, a pew-opener at St Martin's Church, came under my care in March, 1863. Has been pregnant seventeen times, having had ten children and seven miscarriages. The last pregnancy was 18 years back. Got over "the change of life" at 48 Has suffered from the womb coming down for many years. Complains of great pain in thighs, at bottom of stomach, and about the sacrum. Never can sit down in comfort. Sometimes has retention of urine, sometimes an involuntary escape. On March 11th Mr. Hulme administered chloroform, and I amputated a greatly hypertrophied cervix, the only disease which could be detected. On April 18th she was well, with the exception that there was a slight prolapsus of the bladder on standing for any length of time.

Case 4. Mrs. Y., of Greville Street, Hatton Garden, was sent to me by Mr. James Wilson, of Beaufort Buildings, on April 8th, 1864 She was 41 years of age, had been married 15 years, and had had two pregnancies and gone the full time with each, the last child having been born twelve years ago. The catamenia were quite regular. She complained chiefly of leucorrhœa, debility, backache, and of "a falling of the womb," which prevented her from following her occupation. On examina-

8. CANCER OF THE UTERUS.—This fearful affection is most commonly observed under the form of medullary ulceration of the lips of the vaginal portion of the uterus. In the small proportion of about 2 or 3 per cent. the infiltration appears to commence in the mucous or muscular coat of the body or fundus of the womb, the disease occasionally running its entire course while confined to this part, and sometimes spreading downward until the whole organ is involved. Probably in one-third of all the cases of cancer which occur in women the uterus is the organ affected. The pathology, causes, varieties, &c., of cancer having been already treated of (p. 110), it is unnecessary to say anything here upon these heads.

Medullary cancer is very much more frequent than any other variety of malignant disease of the uterus. Examples of scirrhus are not often met with. Cauliflower excrescence, or epithelioma, is also a rare affection, and when discovered, the excrescence is usually found growing from the posterior lip of the uterus. Just as seldom, I believe, an inveterate form of ulcerated epithelial cancer of the lips or interior of the cervix falls under observation.

Symptoms.—In whatever way malignant disease of the uterus sets in, it

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tion great longitudinal hypertrophy of the vaginal portion of the cervix was discovered. On May 3d Mr. Wilson administered chloroform, and I amputated the cervix with the écraseur. As there was some hemorrhage, the vagina was plugged with cotton-wool. The cure was complete by the end of the month.

Case 5. Mrs. M. C., ætat. 45, applied to me on April 26th, 1864. She has been married 15 years, and has been pregnant three times. The last child was born eight years ago. Catamenia regular and natural in quantity. Has leucorrhœa. Since her last labor has had what she calls "a falling of the womb." The sound passes four and a half inches. On June 2d Dr. Meadows administered chloroform, and I proceeded to operate. Drawing down the cervix, a circular incision was made through the mucous covering, and the membrane dissected upwards for rather more than half an inch. The chain of the écraseur was then applied at the upper limit of the dissection and the cervix removed. In this way two flaps were procured, which were brought together over the wounded structure and kept in apposition with wire sutures. Care was taken to maintain a proper-sized os uteri. The sutures were removed at the end of a week and the parts found nearly healed. Shortly afterwards cicatrization was complete. She returned home to the country, quite well, on June 20th.

Case 6. Mrs. P., ætat. 34, has been married several years. Has been twice pregnant: the first time she aborted, but on the second occasion went to the full time. Since this labor she has suffered from "the womb being constantly down." The catamenia are regular. On examination the cervix is found considerably lengthened and altogether increased in bulk. The sound passes easily for four inches and a half. On August 16th, 1865, I amputated two inches of the cervix with the écraseur, the patient being under the influence of chloroform. As there was some bleeding, the vagina was plugged with cotton-wool. In ten days she was able to walk out, feeling quite comfortable, and on August 31st she returned home cured.

Case 7. Mrs. E. T., a widow, in her forty-fifth year, was brought to me by Mr. Tait, of Highbury, in September, 1868. She complains of constant bearing-down pains with prolapsus of the uterus. Has had three children, the last being four years old. The catamenia are regular; has leucorrhœa. I found the cervix uteri hypertrophied, chiefly as regards length. Uterine sound passes easily for nearly four inches. On September 18th, after Mr. Tait had placed the patient under the influence of a mixture of chloroform and ether, I pulled down the elongated cervix and amputated about one inch of it with a pair of strong scissors. The vagina was firmly plugged with cotton-wool. The parts healed well without any untoward occurrence.

Case 8. Miss H., in her forty-ninth year, has long suffered from great pain and irritability of the bladder. These symptoms have been produced by the pressure of a greatly hypertrophied cervix. All remedies having failed to relieve her, though they have been persevered with for many months, I amputated the cervix on March 3d, 1869, assisted by Dr. Percy Boulton.

gives rise to certain prominent symptoms. Briefly, these may be described as consisting of an abundant watery discharge, which is of a dirty pale-green color, and is always offensive, but sometimes so fetid as to render the patient loathsome to herself and almost so to those around her. There are sudden attacks of hemorrhage, which (contrary to what might be expected) diminish in frequency and severity as the disease approaches a fatal termination. Pain is experienced of the most distressing kind; and though at first this may only come on at night, yet ultimately it gives the sufferer no respite unless relief be afforded by medicine. Troublesome disturbance of the digestive organs is present; being chiefly indicated by frequent attacks of nausea with vomiting, distressing flatulence, and a loathing of food. There is likewise most painful mental depression, together with debility, which increases daily, and a rapid wasting of the tissues. It must not be supposed that instances are not sometimes met with where one or more of these symptoms are absent, but they are exceptional cases. Thus, hemorrhage is often the first indication of the presence of cancer of the uterus, though in a few instances the disease has run its whole course without the loss of any blood. When these symptoms, or most of them, have been present for a short time, the patient's countenance assumes that dingy sallow hue and pinched anxious expression so well known as the cancerous facies. This cachectic appearance follows the symptoms just mentioned and never precedes them, while it occurs the more quickly in proportion to the extent to which the patient has been weakened by the discharges and pain. The only constant symptom which I have observed as a forerunner of the outbreak of uterine cancer is great mental depression; this, of course, being attended with its almost necessary accompaniments of loss of appetite and restlessness at night.

With regard to those exceptional cases where the disease remains localized in the body and fundus of the womb, the general symptoms do not vary from those just described. There is particularly the same pain, the same abundant watery discharge, the same tendency to hemorrhage, and the same rapid failure of the vital power. Death usually occurs gradually from exhaustion; but it may take place somewhat unexpectedly from collapse, owing to perforation of the fundus of the uterus accompanied by copious bleeding into the peritoneal cavity.

Diagnosis.—With the great majority of cases the practitioner has no opportunity of making a vaginal examination in the early period of the disease; at that time when the lips of the cervix are merely infiltrated with encephaloid matter, and when they present a moderately hard, uneven, nodulated character. It is but seldom that he is consulted until the disease has far advanced in the stage of ulceration. Then the finger detects readily a more or less deeply excavated ulcer, of a loose spongy character, seated on a tumid hardened base, and surrounded by indurated tissue. The whole womb is felt to be immovably fixed in the cavity of the pelvis; this fixation, which is almost universally present, being partly the result of the infiltration of the connective tissue with cancerous matter, and partly the consequence of early pelvic peritonitis. The vagina is either involved, or it soon becomes so by the gradual infiltration of its tissues; and then the cancerous degeneration extends through the walls of this canal into the bladder, or more rarely into the rectum, or still more rarely into both these parts, so that one large ulcerous cloaca results. As the process of disintegration rapidly proceeds the lips and cervix become completely destroyed, and the body of the uterus gets converted into a funnel-shaped cavity, with its walls irregularly eaten away, or covered with a fungous vascular growth.

When epithelial cancer assumes the form of the cauliflower excrescence its diagnosis is easy. The peculiar feel of the outgrowth, its fringed or papillary structure, the ease with which its tissues are broken down, the exhausting hemorrhages, of frequent occurrence, and the profuse serous discharges which it gives rise to, clearly point out its nature.

Duration.—The average duration of life after ulceration has commenced is barely two years. Prior to ulceration there are probably no symptoms of any importance to direct attention to the uterus; while when this process has set in the patient tries to persuade herself that her symptoms are due to the change of life or to some accident. Consequently, advice is seldom sought for until some six or eight months before death. This event is usually immediately due to exhaustion; though it may happen from pyæmia, uræmia, peritonitis, or hemorrhage.

Treatment.—In very few cases is it possible to do more than attempt to relieve the prominent symptoms as they arise. And in the *first* place the general health is to be maintained as long as possible. Hence, the patient ought to be allowed a wholesome nutritious diet; of which milk and cream, raw eggs, and properly cooked animal food, must form the chief constituents. Stimulants will be needed in almost all cases, and none will be found more useful than either of the light sparkling wines, good sherry, or pale brandy. Malt liquors almost invariably disagree, by aggravating the dyspeptic troubles generally, and especially by increasing the flatulence. Such tonics as ammonia and bark (F. 371), phosphoric acid in some bitter infusion (F. 376, 379), quinine and belladonna (F. 383), zinc and conium (F. 413), and cod-liver oil (F. 389), are valuable in strengthening the system, as well as in alleviating that terrible sinking and feeling of depression which is so generally complained of. Where the stomach is very irritable the use of pepsin (F. 420), of nitro-hydrochloric acid with the dilute hydrocyanic acid (F. 378), or of ammonia and ether (F. 364), gives relief. From one hundred and twenty to two hundred grains of chlorate of potash in a pint of barley-water, taken for some days together, will always cure that soreness of the mouth which is often present. Sucking lumps of ice is frequently grateful; or fruit syrups in iced soda or potash water are very palatable. Much good often arises from the free application of extract of belladonna, with the wet compress, over the stomach. Small doses of castor oil, or of confection of senna with the juice of taraxacum (F. 194), or the use of simple enemata, will regulate the bowels better than any other aperients. It need scarcely be added, that the purer and more bracing the atmosphere in which the patient lives the better. Moreover, as all ovarian or uterine excitement must prove very injurious, sexual intercourse is to be strictly forbidden, even though the disease be in an early stage. It is in consequence of this tendency to ovarian excitement or irritation that I very rarely resort to the administration of any preparation of steel in cases of cancer uteri; since these remedies, as has already been pointed out, cause congestion of the sexual organs, and increase the pain and tendency to hemorrhage. I am sure that much mischief is done in many other diseases of the uterus by the indiscriminate way in which ferruginous tonics and chalybeate waters are given.

Then, *secondly*, the practitioner must endeavor to keep the sufferer as free from pain as possible; for while persistent uneasiness causes anxiety and irritability, long-sustained physical suffering will alone suffice to kill. In the early stages, a good night's rest may often be afforded by the administration of a couple of pills of henbane and camphor (five and three grains), washing them down with a peppermint draught containing fifteen or twenty minims of the spirit of chloroform. But sooner or later the time arrives

when full doses of opium or morphia are needed to allay the anguish. The subcutaneous injection of morphia (F. 314), repeated every eighteen or twenty-four hours, proves very valuable. For exhibition by the mouth or rectum, no preparation is so generally useful as the extract of opium; since, when given in a dose proportionate to the necessities of the case, it seldom induces that subsequent nausea and headache which are so commonly caused by the tincture or the powder. Chloroform, spirit of ether, henbane, Indian hemp, and conium are also useful; and especially so are mixtures containing combinations of these drugs (F. 317). Very frequently, and more particularly when the bladder is irritable, I employ belladonna locally; mixing four or five grains into a pessary with the oil of theobroma, and directing it to be introduced into the vagina every night. When this canal is free from disease, the application to the cervix of a frigorific mixture, by means of a gutta-percha speculum, often affords considerable relief. Although the employment of intense cold as a means of cure is quite futile, yet as an adjunct to other remedies for the relief of suffering it is of much value. I have tried the local application of carbonic acid gas, as well as the injection into the vagina of chloroform vapor, but neither proceeding has appeared to be of the slightest service. Sympathetic pains in distant parts are best relieved by the use of strong belladonna liniments or plasters; or by what is often more effectual, the subcutaneous injection of morphia.

In the *third* place, it has always seemed important to me to check the attacks of hemorrhage as speedily as possible. Independently of the alarm and depression which every flooding gives rise to, I am sure that the loss of blood rapidly hastens the case to a fatal termination, although immediate death from bleeding is of rare occurrence. The general remedies in which I have most faith are gallic acid, the mineral acids, and cinnamon; the acetate of lead, turpentine, and digitalis having only disappointed me. A very useful draught, which may be given every two or three hours during an attack of bleeding, can be made with twelve grains of gallic acid, fifteen or twenty minims of the aromatic sulphuric acid, a drachm and a half of compound tincture of cinnamon, a drachm of syrup of poppies, and water. It must be confessed, however, that local applications are often more valuable, since they more speedily effect our object than medicines given internally. If a small speculum can be used, the bleeding will generally be immediately controlled by inserting into the ulcerated surface a plug of cotton-wool, moistened with a strong solution of the perchloride of iron in glycerin; or a plug of simple cotton-wool may be gently resorted to, when it is deemed improper to introduce any instrument for fear of rupturing the vascular mass. So also the actual cautery cautiously applied, will commonly at once serve to close the orifices of the bleeding vessels. But the great disadvantage of these applications is generally that they cannot be employed when they are most wanted; for the floodings come on suddenly and violently, to the patient's great alarm. I frequently, therefore, instruct the nurse how she may use an injection of alum and gallic acid, or of infusion of matico, under these circumstances; explaining that it is only necessary to have the hips well raised by pillows and then to inject with a common syringe, or even to pour into the vagina through a funnel a small quantity of either of these astringents, in order to moderate the discharge of blood, if not to control it entirely. Sometimes a pessary, made with as much tannin as can be held together by thirty grains of cacao butter, forms an effectual styptic. The use of ice to the vulva may also be recommended.

And *fourthly*, it is necessary to mitigate the horribly offensive odors of

the discharges; by accomplishing which we may generally also succeed in lessening the quantity of the serous flow. This duty will not be thought unimportant by any practitioner who has had the misfortune to see a few neglected or badly-managed cases. Now to begin with, it is advisable (at least as far as the women seen in the hospital out-patient rooms are concerned) to recommend free ablution twice or thrice daily with tepid water. Then, when we can depend upon injections being gently but effectually used about twice a day, with a proper siphon syringe, we may order from twenty to thirty grains of the crystals of carbolic acid to the pint of water; or twenty grains of chloride of zinc, or one drachm of creasote, in the same quantity of fluid as for the acid. The permanganate of potash (grs. 20–40 to the pint of water) makes a capital injection. So does simple tar-water; obtained by stirring a pint of tar with a gallon of water for fifteen minutes, and then decanting. In several instances comfort has been derived from the use every night of a pessary containing extract of logwood and cacao butter (thirty grains of each); an application, the power of which is not deteriorated by having combined with it belladonna or morphia. And, lastly, I have known ladies attempt to prevent the fetid smell from being perceptible to others by padding the vulva with small muslin bags of vegetable charcoal; a practice which is only of any value in exceptional cases and under peculiar circumstances.

Now the measures which have just been described may be said to be those which are to be practiced in almost every instance of uterine cancer; and it is certain that by their skilful adaptation to the exigencies of each particular case much good may be done. But once in a way it happens that we see the patient when the affection is in an early stage, or when it assumes the form of a polypoid excrescence, or when it appears limited to the cervix uteri. Under these circumstances it becomes an anxious question whether some more decided plan of treatment may not be useful; whether something cannot be done to eradicate the disease completely, or at least materially to check its progress. The truth must unfortunately be confessed that here the art of the physician, for the most part, fails him. Uterine cancer seems really to be much more virulent and less amenable to treatment than cancer of the breast. With regard to specific remedies in cancer of the womb, I can only say, that I have never seen anything approaching to permanent benefit from their employment. Powerful escharotics, repeatedly and thoroughly applied to the diseased surface, have never seemed to me to retard the disease. And the same disappointment follows excision of the neck of the womb; whether this operation be performed with the écraseur, the knife, or the ligature. If there are any exceptions to this statement, it is in the case of epithelial growths (cauliflower excrescence); but even here I fear that in almost all instances the good which may be done is merely temporary. In only one instance can I persuade myself that I effected a cure by amputating the cervix, and in this instance the patient was lost sight of twelve months after the operation. Yet I do not consider that this proceeding is altogether to be condemned. It will possibly in a few instances prove beneficial; and it may certainly be said that neither in my own practice, nor in that of a few other physicians which I have had the opportunity of seeing, has it done any mischief. It gives the patient the inestimable comfort of hope revived; so that for a few months, by controlling the symptoms, it greatly lessens anxiety if it does not afford complete peace of mind. The misfortune is, that the cases are so rarely met with in which there is a fair chance of this operation succeeding; since, for reasons already insisted on, patients rarely apply for advice in the early stages of uterine cancer.

Extirpation of the entire uterus has been practiced on some twenty-six occasions for the cure of cancer; but I am only acquainted with one well-authenticated report of its having been really successful, though in four instances the patient recovered from the operation. In the successful case, the woman remained well for twenty-five years. But it must be remembered that there was a previous procidentia of the organ, so that the operator, Conrad J. M. Langenbeck, had a comparatively easy task; while, without being hypercritical, a doubt may be suggested as to the correctness of the diagnosis. The details of the case are given by Professor Max Langenbeck in his thesis *De totius Uteri Extirpatione*, Göttingen, 1842. One successful result, however, from a very dangerous proceeding, cannot outweigh a number of failures; failure, be it remembered, implying death within forty-eight hours in fifteen out of twenty-two fatal cases. Hence it is almost unnecessary to say, that no practitioner in the present day would be justified in following the example of the elder Professor Langenbeck, Recamier, and Blundell, with regard to this operation.

It occasionally happens that cases of cancer of the uterus complicated with pregnancy are met with; and when the gestation has not advanced beyond a few months, it becomes a question of some moment as to whether a miscarriage should be induced. There is but little doubt that, as a general rule, it is best to take the proper steps for emptying the uterus at as early a period as possible. The process of parturition, at or near the full term, is one of considerable suffering and risk when the cervix is infiltrated with cancer; two great sources of danger existing—viz., the liability to hemorrhage and to rupture of the uterus. Sometimes even delivery by the natural passages after the seventh month is quite impossible; and two physicians in this country have had to resort to the Cæsarian section under these circumstances. For further remarks upon this subject the reader may refer to the description of a case of multiple cancer complicated with pregnancy, in which I induced abortion, for reasons fully stated in my paper.*

VIII. UTERINE TUMORS AND OUTGROWTHS.

The tumors to be considered in this section are: fibroid tumors, with a short notice of recurrent fibroids; uterine polypi; and cystic degenerations of the uterus.

1. FIBROID TUMORS.—Of all the organic diseases of the uterus which first manifest themselves during the period of sexual vigor, the non-malignant tumors are the most common. In the present section I intend to speak only of the non-pediculated or fibroid bodies—commonly known as fibrous tumors of the uterus.

Pathology.—Fibroid tumors may be developed in any portion of the uterus. According to their position they are often classified as subperitoneal or surface tumors, when just beneath the peritoneum; interstitial or intra-mural tumors, when imbedded in the uterine walls; and submucous or intra-uterine tumors, when they are pressed into the cavity of the womb. Fibroids consist of outgrowths of uterine tissue. The dense and firm mus-

* Transactions of the Obstetrical Society of London, vol. iv, p. 243. London, 1863.

cular structure of the uterus is made up of bundles of smooth or unstriped muscular fibres, arranged in layers; together with areolar or connective tissue, bloodvessels, lymphatics, and nerves. And so we find that uterine tumors are composed especially of unstriped muscular fibre, an element which is wanting in fibrous tumors. Hence the use of the term "fibroid" in preference to that of "fibrous" as ordinarily employed.

Fibroid tumors are met with at all ages after puberty, though they occur most frequently between the years of 25 and 48. The earliest age at which I have observed such a growth has been 18, the woman being married. It is very probable that these tumors occur equally in the married and single, in the sterile and fruitful. My own notes of cases of true uterine fibroids, show a preponderance of married sterile women; but the experience of one practitioner is of little value on such a point. The following table, however, gives the number of cases of both non-pediculated fibroid tumors and of polypi, of which I have kept a record, between January 1st, 1851, and January 1st, 1869, exclusive of fifteen doubtful instances, where the diagnosis was either imperfect or the statements of the patients seemed unreliable:

	Fibroids.	Polypi.
Virgins,	31	13
Married and sterile,	49	10
Been pregnant, but always aborted,	7	1
Borne one or more children,	25	22
First pregnancy while under treatment,	1	0
	113	46

Fibroid tumors vary in size from that of a small nut to that of a fœtus at the full term of gestation; indeed, their bulk is sometimes much greater than that of a newborn infant. They commonly weigh one or two pounds, but they have been found frequently as heavy as six or eight pounds; while extraordinary cases are recorded where they have reached thirty, forty, and even seventy pounds. In form they differ considerably, but usually they are round, or pear-shaped, or irregular and lobulated; although in consequence of pressure they may attain every imaginable figure. When the cavity of the womb becomes much enlarged by a fibroid projecting into it, the uterine walls get hypertrophied, while their sinuses may undergo development as in pregnancy. Under the influence of congestion (such as occurs at the menstrual periods) the walls of one or more of these venous canals may get ruptured; blood being poured out until a coagulum forms, or the opening heals, or the uterine contractions compress the bleeding orifice against the tumor.

These growths may exist alone or in combination with other diseases; it is not uncommon to find a fibroid and a mucous polypus in the same case. Occasionally with a fibroid of the womb there is a cystic tumor of the ovary. Fibroids will also be single or multiple. Very often there are three or more separate tumors; and in one specimen which I removed from the body of an old woman, as many as nine distinct outgrowths from the external walls of the uterus could be counted. In the Hunterian Museum a preparation (No. 2674) may be seen in which eight or nine large fibroids are present in the uterine walls, all of them projecting upon the peritoneal surface; the largest growth retaining only a narrow base of attachment to the fundus of the uterus, while another somewhat smaller is fixed to the side of this organ by a flat band.

The tumors recognized as *recurrent fibroids* differ from ordinary fibroids

inasmuch as if removed a new growth forms at the site of the old one; while all such bodies manifest a tendency to ulceration, followed by free discharges of blood and fungous degeneration. Recurrent fibroids destroy life with almost as much certainty and rapidity as scirrhus does. Fortunately, they are very seldom developed in the walls of the uterus.

Symptoms.—The symptoms produced by fibroid tumors are often neither important nor well-marked; and indeed these growths not unfreqently exist without giving rise to a suspicion of the presence of any uterine disease. But on the other hand, when of a size sufficient to be detected through the abdominal wall, they are usually the cause of menstrual disturbance; of a leucorrhœal discharge; of a dull, aching, or throbbing pain in the back, especially all over the sacrum; of a sense of weight and bearing-down in the pelvis; of cramp or numbness in one or both thighs; of a difficulty in evacuating or in holding the urine; and of constipation, with hæmorrhoids. Just as pediculated fibrous tumors (commonly known as uterine polypi) are almost always attended by one very prominent symptom, viz., hemorrhage; so, with a little latitude, it may be said that the same happens in submucous tumors merely projecting into the cavity of the uterus. When the first symptom of the existence of a fibroid is a sudden attack of hemorrhage, the patient not unfrequently tries to persuade herself that she has been pregnant, and aborted; but the practitioner must not be misled by her statements or opinions. He will distinguish the true nature of the disease by learning that the loss of blood has probably been excessive; that the hemorrhage has returned more than once without warning, and without being accompanied by uterine contractions or pain; and especially by finding that the tissue of the cervix is firm, and the os thin and small, instead of being relaxed and swollen and patulous as after abortion. Very frequently, especially with submucous tumors projecting into the cavity of the uterus, the patient first has her attention directed to the womb by noticing that the menstrual discharge is more abundant than usual, that its duration is greater, that it is attended with clots, and that its cessation is followed by leucorrhœa. The monthly periods also recur more frequently than is natural; they are accompanied with great pain in the back and thighs, and bearing-down or dragging sensations; there may be expulsive efforts, simulating labor pains, sometimes occurring only with the catamenial flow, and sometimes coming on in the intervals with more or less frequency; while during the time the courses continue, and even for some few days before and afterwards, the patient is incapacitated from following her usual duties. Now and then there is actual flooding.

On making a vaginal examination we shall generally find the weight of the uterus increased, while its mobility is somewhat diminished; the vagina also being lessened in length. If the tumor be in the cavity, the os may sometimes be felt quite patulous, and the tumor projecting between its lips; but more frequently the mouth of the uterus is closed, and the cervix absorbed into the substance of the walls, so that we feel merely a rounded body with a slight depression and opening at its lowest part. When the tumor occupies the posterior wall it often produces retroversion of the uterus; and consequently the fundus of this organ then lies upon the rectum, while the cervix is pushed forwards and upwards under the pubic arch. Supposing the growth to be in the anterior wall, the uterus will frequently be found anteverted; that is to say, it will lie across the pelvis with its fundus on the bladder, and its os looking directly towards the sacrum. Instead of retroversion or anteversion, there may merely be retroflexion or anteflexion; or the tumors may even be large and heavy, without causing any uterine displacement whatever. Provided that the practitioner is cer-

tain of the non-existence of pregnancy, he will derive great assistance in forming a positive opinion on the nature of the growth and its exact position from the use of the uterine sound. When this instrument is introduced into the healthy uterus, it passes for two inches and a half; and by it (without any rough manipulation) the organ can be slightly elevated, or turned to either side, or bent backwards or forwards. In most instances of fibrous tumor the cavity is elongated; while if the tumor be in the walls, or broadly attached to them, the sound appears to enter the mass so that the uterus cannot be separated from it, both can only be moved simultaneously, and at the same time the womb is found to have lost its healthy mobility and freedom.

Whatever may be the cause of uterine enlargement, whether it be a tumor or retention of the catamenia, the breasts generally become somewhat developed and tumid; while sometimes the areola also darkens, or the follicles increase in size and number. But it is only in pregnancy that the nipples and the areolæ undergo all those peculiar changes which are so characteristic of this state; for in no other cases do we find, combined with the development of the glands, enlargement of the follicles and an increase in their number, œdema of the areolæ, moisture of these parts, and a gradually increasing deposit of pigment in their tissues.

If we practice auscultation over a fibroid tumor we shall very frequently detect, synchronous with the pulse, a loud souffle; which may sometimes be due to the pressure of the growth on the aorta or iliac arteries, but which I believe generally has its seat in the vessels of the enlarged uterus. This murmur might lead to the case being mistaken for pregnancy; but unless this condition coexist, we shall of course be unable to discover the fœtal heart, or anything approaching to fœtal movements.

Terminations.—Fibroid tumors of the uterus are generally benign and harmless; many patients having been known to live for twenty, thirty, or even more years after the growth has first manifested itself. In such cases, the tumors commonly attain a certain size, and then remain stationary; giving rise to no symptoms beyond what may be produced by their bulk or their pressure upon other organs. Where a fibroid induces severe attacks of hemorrhage, however, the results are likely to be more serious, though death very seldom occurs from this cause. In only one of my cases has death taken place from anæmia due to the frequent floodings; the fatal event happening nearly seven years after the first abundant bleeding. The constant leucorrhœal discharge will ofttimes induce weakness, but I have never seen anything like a dangerous set of symptoms from this source.

Fibroids occasionally undergo a cystic degeneration; one or several cavities, containing a limpid fluid, being developed in their centres. I do not believe, however, that the whole tumor can thus be converted into a simple cyst, as some authors seem to imagine. In the cases which have led to this idea being entertained it is probable that one or more fibroids have coexisted with a cystic growth. Now and then these fibroids become swollen, softened, and œdematous; either as the result of great congestion, or possibly of a low form of inflammation. In the same way, an abscess may form in the interior of the tumor; an unfortunate result, which has proved fatal in most instances where it has happened. A more favorable event is that of fatty degeneration; a change which occurs much more rarely than might be expected.

That fibroids are occasionally partially absorbed is I believe certain; while it is highly probable that they may be entirely removed in this way,

especially after the permanent cessation of menstruation, quite independently of any treatment.*

The subperitoneal and submucous fibroids not uncommonly become gradually pediculated, so that in the latter case they may be removed like other polypi. But in both instances it has occasionally happened that the tumor has become entirely detached from the uterus; the growth, when of the subperitoneal kind, having been found with an attachment to one of the abdominal viscera. It is even said that a fibroid may remain loose in the cavity of the peritoneum, and be nourished in the same way that a loose cartilage in a joint is kept from decay. I have never, however, seen any example of such an occurrence.

And, lastly, a fibroid may undergo calcareous degeneration—a process which is probably allied to that spoken of as ossification of the coats of the arteries, such as is met with in old people. Whether these tumors ever suffer from malignant degeneration, is a disputed point. I have met with three or four cases where the most careful local examination could detect nothing but what appeared to be true fibroids; though the general symptoms, and the fatal results, proved that the tumors were cancerous. But whether they were so from the beginning, or whether they were originally fibroids which became infiltrated with cancer, I cannot say.

Treatment.—As a general rule, I believe that the less we interfere with fibroid tumors, the better will it be for the patient. It is exceedingly doubtful, if drugs have any power in producing absorption of these bodies or even of arresting their growth. I have watched the effects of mercury, iodide of potassium, chlorate of potash, and liquor potassæ, when given by myself or others, and I have never seen these remedies exert the slightest favorable effect. I question very much whether the chloride of calcium will prove of any real value; although Dr. McClintock has met with one case which got well, after taking the liquor calcii chloridi of the Dublin Pharmacopœia (the now officinal chloride of calcium, in solution) for two years. In the few instances where I have tried this remedy, it has appeared

* The following case affords a striking example of partial absorption synchronous with the climacteric change: Mrs. T., 42 years of age, came under my care on October 15th, 1856. She has been married eight years, and never been pregnant. The catamenia are irregular: has leucorrhœa. Has had some severe attacks of flooding—one in August, 1854, a second in October, 1854, a third in January, 1855. Then for nine months there was no excessive loss; but at the end of this time the hemorrhage became so abundant that she had to be admitted into Charing Cross Hospital. She did not detect any abdominal tumor until the Christmas of 1854. Since then, has rapidly increased in size, so that now she is quite as large as a woman at the full term of gestation, the uterus reaching to the ensiform cartilage. On making an examination, the vagina is found contracted, the uterus high up in the pelvis, while presenting at the os uteri (which is as large as a penny piece) is a hard fibroid tumor. This tumor is evidently too large to be drawn through the pelvic cavity. As there were no urgent symptoms, her general health was improved with tonics, &c. In January, 1859, the tendency to flooding returned, and it seemed desirable to remove the tumor, if possible. I thought that by ligaturing a portion of it, there would be a possibility of getting away the part when dead, and that by repeating the operation the whole might ultimately be removed. All attempts, however, to pass Gooch's canula, armed with whipcord, failed; owing to the presence of firm adhesions between the front of the tumor and the uterus. Drs. Tyler Smith and Graily Hewitt, who were present, allowed that they had rarely, if ever, seen so large a tumor. After this attempt the flooding lessened in frequency again. Twice or thrice there was a severe loss; but it was generally checked in a day or two by perfect rest, and the administration of gallic acid with cinnamon. I frequently saw this patient afterwards up to the year 1865. The tumor had long been decreasing in bulk; there had been no hemorrhage for many months, the catamenial periods having apparently ceased about the beginning of 1864; and the abdomen was then of natural dimensions, the tumor being reduced to about the size of the fist.

to do neither good nor harm. The same remark applies to the chloride of ammonium, which I have used perseveringly. The bromide of potassium has also been largely employed, and all that I can say in its favor is, that one patient became pregnant while taking it. The history of this case, abbreviated from my note-book, runs thus: Mrs. E. R., 35 years of age, has been married six years, and has never been pregnant. The catamenia are regular. Applied to me on October 24th, 1855. A fibroid tumor, about the size of a cocoanut, could be detected in the anterior wall of the uterus. She was ordered the bromide of potassium and cod-liver oil, both of which remedies she took for twelve months; and although the general health improved, the tumor did not sensibly diminish in size. Up to July 12th, 1856, the catamenia were natural and regular; but they did not appear after this date. On April 19th, 1857, I delivered her of a fine female child: both mother and infant did very well. Three months afterwards the uterine tumor could still be detected, but it was greatly diminished in size.

Remembering therefore the low vitality of these bodies, that they frequently are only productive of mechanical inconvenience, that they will often attain a certain size and then remain stationary for years, and that their partial absorption or degeneration occasionally takes place at the climacteric change, we had better be content with limiting our treatment to the palliation of any important symptoms which may arise. The danger of attempting a radical cure, either by enucleation or by gouging the growth and scooping away portions, or by opening the abdominal cavity and extracting the tumor, is so great, that I should be loath to recommend any such proceedings. It is certain that even in the case of a pediculated subperitoneal fibroid, the risk of the abdominal section and removal of the tumor is much greater than that of ovariotomy; although it is not easy to see why it should be so. I am of course aware that large uterine tumors have been extirpated by opening the abdomen, and that in the hands of Dr. Clay and M. Kœberle and two or three American surgeons, such operations have been now and then successful. Dr. Storer has removed the uterus and both ovaries by abdominal section, the patient recovering.*

* Dr. Storer, in the report of this case (American Journal of the Medical Sciences, January, 1866) gives a table of cases in which the entire uterus, with both ovaries, has been extirpated. In some of these, the uterine character of the disease was probably not suspected until the abdomen had been opened; the tumors having been diagnosed as ovarian. The dates at which the operations were performed, together with the causes of death, are as follows:

1.	Clay,	August, 1843,	Fatal, owing to hemorrhage.
2.	Heath,	November, 1843,	Fatal, owing to shock.
3.	Clay,	January, 1844,	Fatal, owing to accident.
4.	Parkman,	January, 1848,	Fatal, owing to hemorrhage.
5.	Burnham,	June, 1853,	Successful.
6.	Kimball,	September, 1853,	Successful.
7.	Peaslee,	September, 1853,	Fatal, owing to peritonitis.
8.	Kimball,	Date not given, but prior to 1863,	Fatal, owing to hemorrhage.
9.	Kimball,	Date not given, but prior to 1863,	Fatal, owing to inflammation.
10.	Burnham,	Date not given, but prior to 1863,	Fatal, owing to shock.
11.	Burnham,	Date not given, but prior to 1863,	Fatal, owing to shock.
12.	Burnham,	Date not given, but prior to 1863,	Fatal, owing to shock.
13.	Burnham,	Date not given, but prior to 1863,	Fatal, owing to peritonitis.
14.	Burnham,	Date not given, but prior to 1863,	Fatal, owing to peritonitis.
15.	Burnham,	Date not given, but prior to 1863,	Fatal, owing to peritonitis.
16.	Burnham,	Date not given, but prior to 1863,	Fatal, owing to peritonitis.
17.	Spencer Wells,	October, 1861,	Fatal, owing to shock.
18.	Clay,	January, 1863,	Successful.
19.	Kœberle,	April, 1863,	Successful.
20.	Baker Brown,	1864,	Fatal, owing to hemorrhage.
21.	Burnham,	September, 1864,	Successful.
22.	Sands,	June, 1865,	Fatal, owing to hemorrhage.
23.	Buckingham,	June, 1865,	Fatal, owing to shock.
24.	Storer,	September, 1865,	Successful.

From the above it appears that, prior to 1863, there had been 17 operations and

But exceptional cases can form no guide for general practice: otherwise the so-called "triumphs of obstetrical surgery" will have a most disastrous influence.

One of the commonest symptoms we have to treat is menorrhagia, which occurs most frequently in the submucous and next in the intramural fibroids. The most efficient drugs are corrosive sublimate (F. 27); gallic acid alone, or in combination with the aromatic sulphuric acid and cinnamon (F. 103); the oxide of silver with Indian hemp (F. 47); and the iron-alum (F. 116), which is particularly useful where there is much anæmia. But it sometimes happens that all astringents prove inefficient, and we must then resort to surgical measures. An excellent practice is that recommended by Dr. McClintock, Mr. Baker Brown, and M. Nélaton; who all allow that a free incision of the os and cervix uteri is generally followed by a remarkable decrease in the hemorrhage. According to Mr. Brown, the division of these parts permits the fibres of the body of the uterus to contract upon the contained tumor so as to compress the vessels. Whatever the explanation may be, however, I can confirm the statement that the operation is frequently very efficacious in preventing metrorrhagia. Where the fibroid can be reached, Dr. Atlee recommends a free incision into the most exposed part of the tumor; which is to be practiced by passing a bistoury, upon the finger, along the vagina into the uterine cavity. The incision is followed by a slight gush of blood, but as the cut ends of the vessels quickly retract and get closed by clots, the hemorrhage entirely ceases. According to this gentleman, therefore, the source of the discharge is not in the uterine walls, but in the vessels of the membrane covering the tumor.

When a fibroid is confined to the true pelvis, and by its pressure is interfering with defecation and micturition, or causing severe cramps, these mechanical inconveniences may possibly be removed by pressing the growth upwards into the false pelvis. The difficulty is that there will perhaps be adhesions, though they cannot always be detected; and if these be ruptured fatal peritonitis may ensue. Moreover, it is by no means easy to draw the line between judicious and injudicious force. In one instance where I succeeded in efficiently raising the tumor, I certainly remember that an amount of force had to be employed which many would have condemned. However, great relief was afforded without any mischief resulting. Sometimes, where the pains, &c., are due to temporary congestion of the growth, or to œdema, the administration of the bromide of potassium (F. 42) will remove these complications; or they may be subdued by the use of the Kreuznach waters (F. 484), the patient's system being at the same time invigorated by the change of air and the regular living adopted at this bath.

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15 deaths; whereas, up to the end of 1865, there had been 24 operations and only 18 deaths. But as showing how little reliance can be placed on limited statistics when used as guides for treatment, it must be added that between the publication of Dr. Storer's paper and the close of 1868, at least five more of these operations have been performed, four of which have ended fatally. Amongst these latter are some of Dr. Storer's. Consequently, the results so far are—29 operations with 22 deaths. The total causes of death have been 8 from shock, 7 from inflammation (mostly peritonitis), 6 from hemorrhage, and 1 from accident several days after operation. Four out of seven of the successful results have been obtained in New England,—one in Connecticut, one in Rhode Island, and two in Massachusetts. The size of the mass removed in six of the successful cases was as follows:

Burnham,	8 and 16 pounds.
Kimball,	Not exceeding 10 pounds.
Clay,	11 pounds.
Kœberle,	Upwards of 10 pounds.
Storer,	37 pounds.

2. POLYPUS OF THE UTERUS.—The term polypus [from *Πολὺς* = many + *πούς* = a foot] is by general consent here employed to designate those tumors which are attached to the inner surface of the uterus by a pedicle or neck. They differ much in size; sometimes being scarcely larger than a pea, while on other occasions they have a bulk equal to that of the adult head. Moreover, they are either found occupying the uterine cavity, or they may be in the vagina and merely attached to the fundus or body or cervix of the uterus by their pedicles.

Pathology.—Polypi vary in structure, but it is probable that they may all be referred to one of the three following species, viz., the fibroid, the mucous or gelatinous, and the placental.

The *fibroid* have the same structure as the tumors of the uterus already described; that is to say, they are essentially outgrowths of the uterine muscular tissue. I believe that it is not an uncommon occurrence for a common intra-mural fibroid gradually to assume the polypoid form, as it increases in size, and gets forced more and more into the uterine cavity by the muscular contractions. These contractile efforts are, in fact, attempts on the part of the uterus to throw off the tumor, and they might be divided into three stages—in the first they render the growth polypoid; in the second, they expel the tumor into the vagina, possibly with all the symptoms which attend a natural labor; while in the third, they would cause rupture of the neck of the fibroid, did not art generally step in and divide this part.

The *mucous* or *gelatinous* or *cellulo-vascular* polypi spring from the canal of the cervix. They are composed of delicate bundles of fibro-areolar tissue covered with mucous membrane containing numerous bloodvessels. They are often very small, perhaps seldom exceeding a walnut in size; but notwithstanding their minuteness, they frequently give rise to attacks of free hemorrhage and cause the catamenial periods to be unduly prolonged. It is probably true, as Dr. Hassall has conjectured, that these growths sometimes have their origin in enlarged villi of the cervix. In the Hunterian Museum there are four preparations (Nos. 2660–2663) very clearly showing the form and attachments of these polypi.

Placental polypi are produced by portions of after-birth left in utero, after an abortion or a labor at the full term. The profession is indebted to Dr. Carl Braun, of Vienna, for showing the great importance of retained masses of placenta in the pathogenesis of uterine polypi. This eminent physician and pathologist believes that at least the majority of the so-called fibrinous polypi are the remains and products of pregnancy; and his opinion has been especially confirmed by Dr. Stadfeldt in a paper which should be read by every obstetrician.* From this essay it appears that Dr. Braun rests his views on five cases, in which at a variable interval after delivery there was violent hemorrhage from the uterus. On examination the polypi

* "On Placental Polypi and Placental Remains in the Cavity of the Uterus. By Dr. Stadfeldt, of Copenhagen. Translated from the Hospitals-Tidende for December 25th, 1861, by William Daniel Moore, M.D." The Dublin Quarterly Journal of Medical Science, vol. xxxvi, p. 491. Dublin, 1863.

An interesting case of fatal hemorrhage from placental polypus has also been recorded by Mr. John S. Beale (Lancet, April 23d, 1864). At the autopsy, on opening the uterus, a fleshy tumor seven inches in length, and surrounded by a coagulum weighing over twenty ounces, was exposed. The tumor was attached by a pedicle, over one inch in diameter, to the right side of the fundus uteri. This pedicle was about three inches in length, and so firmly adherent that the uterine wall was injured in its removal. The tumor itself was about three inches long, by seven broad; and it consisted of a glossy, soft, even mass, which presented the cotyledonous structure (only smaller) of the placenta, with the usual spongy areolar tissue.

were found; in four instances being extracted with the finger, while in the fifth the tumor separated spontaneously. On investigation these bodies distinctly exhibited the composition of the placental tissue. He moreover describes two preparations in the Vienna Museum, in which may be seen polypoid tumors in puerperal uteri, and these tumors consist of distinctly recognizable placental remains. It is of course no new fact that a portion of placenta may be left in utero after the removal of the greater part of this structure, and that while so retained it may be the cause of serious attacks of hemorrhage. But it has not previously been shown that such placental débris can assume the external form of a polypus, and may, even years after delivery, give rise to all the symptoms of a common polypus.

Symptoms.—The most important symptom produced by a polypus is profuse menstruation. After a time there are likewise irregular and frequent discharges of blood, often amounting to attacks of flooding. The tumor also, by its irritating effect upon the mucous lining of the uterus or vagina, gives rise to an abundant leucorrhœal discharge, which discharge is often sanious, while in other respects its character varies according to its seat. Moreover, as the growth increases in size, so by its pressure it irritates the pelvic viscera; and we have complaints of frequent micturition, tenesmus, backache, &c. Occasionally, also, there are paroxysms of pain such as attend upon abortions. Where the growth has only formed after the change of life has occurred, then a discharge of blood will probably be the first symptom manifested. Ofttimes under these circumstances the bleeding does not return for a considerable period; while it is seldom as abundant as in younger women. So true is this, that in maiden ladies over the age of fifty the polypus can often be left alone, little risk resulting from such a practice, while it saves a probably oversensitive woman from much mental and physical suffering.

The foregoing symptoms are of little value, except in so far that they show the necessity for a digital examination. On instituting this, all doubt about the nature of the case is removed when the practitioner finds the tumor in the vagina, or feels it presenting at the dilated orifice of the uterus, while at the same time the sound can be made to enter the uterine cavity for two inches and a half. But frequently there is no body present in the vagina, and the os uteri is closed. Sometimes, under these circumstances, the cervix is discovered much shortened, and the uterine body more or less enlarged; or there is retroflexion or anteflexion of the uterus, or even greater displacement; or the position of the womb is normal, while the educated finger feels that this organ is heavier than natural, with its body round and increased in size. The investigation must therefore be pursued another stage with the aid of the uterine sound; by which instrument the size of the uterus will be learned, and the presence of any movable substance in the cavity be ascertained. If still there be doubt, the os and cervix ought to be dilated by tents, in the manner presently to be mentioned, so that the interior of the uterus can be explored by the finger. I have made several attempts to obtain a view of the uterine cavity by means of Dr. Cruise's endoscope; with which instrument deep cavities hitherto looked upon as inaccessible to sight, have been satisfactorily examined. In the cases under consideration, however, the results have been negative.

Terminations.—So long as the polypus remains either in the uterus or vagina there is, as a general rule, considerable danger from the hemorrhage. This is invariably true with regard to women under the age of forty-eight or fifty. Although the bleeding very seldom destroys life directly, yet it often goes on to such an extent as to induce severe anæmia;

while it may even lay the foundation for some tubercular affection. And it is important to remember that the amount of hemorrhage is in no way dependent upon the size of the tumor; a polypus no bigger than a hazelnut often giving rise to as much flooding as a very large growth. This circumstance has been said to afford support to the view that the bleeding takes place from the uterus, and not from the tumor as some imagine; but it is very possible that the blood is poured out both from the tumor and the uterus.

Very rarely the tumor has set up inflammation and ulceration of the uterus; the morbid action having progressed to such an extent, in a few instances, as to destroy adjoining structures.* In this way a portion of the uterine wall has been gradually eaten away; this destruction being followed by the polypus making a passage for itself through the coats of the bowel, or of the abdominal wall, or of the perineum. A termination of this kind is, of course, very rare; but it serves to show how extensive the irritation must be in these cases to be capable, even once in a way, of setting up such destructive inflammation.

Treatment.—I do not think it necessary to speak here of the remedies which may be employed to relieve the symptoms, because it is mere trifling to waste time with astringent injections, blisters to the sacrum, and astringent medicines. So long as the tumor remains, it does so to the jeopardy of the patient. Undoubtedly in some cases a polypus will degenerate, and a spontaneous cure result. Or the pedicle can be fractured by strong uterine contractions forcibly expelling the growth entirely out of the sexual organs.

* The following remarkable case (Mémoires de la Société de Chirurgie de Paris, tome ii, p. 1, Paris, 1851) is a proof of the truth of the remark in the text: On May 12th, 1847, a laundress, ætat. 51, the mother of seven children, put herself under the care of M. Loir. The menses had stopped at the age of 46, but two years subsequently she became liable to attacks of uterine hemorrhage. On examination, M. Loir detected the enlarged uterus above the pubes; while a soft polypus was felt at the upper part of the vagina. This polypus, the size of a fowl's egg, came away while an attempt was being made to put a ligature round it; and the profuse hemorrhages to which the patient had been liable then ceased. The cervix became healthy, but the bulk of the uterus did not diminish, and a tumor could be felt in the body. On June 19th expulsive pains set in; the os uteri closing, however, instead of dilating. The skin above the pubes became red and tumefied, and at this part the tumor could be distinctly felt. There was fever, with disturbance of the digestive organs. During the ensuing fifteen days eschars were formed at the lower part of the abdominal wall, their separation being accompanied with a purulent and fetid sanies. Suppurating engorgements extended towards the iliac fossæ, particularly to that of the right side. On July 6th the detached eschars exposed a black substance, about the size of two fists. By July 12th the general health had become much impaired under the influence of the offensive discharges from the gangrenous mass, the vomitings, &c. Two days subsequently the prominent portion of the growth was excised; but the patient refused to submit to the attempts which were made to extract the tumor. She gradually sank, and died on July 31st. At the autopsy, the aperture in the abdominal wall was found to measure 3½ inches in length, by 2½ in breadth; and through it a gangrenous pediculated tumor, the size of a fist, protruded. The uterus was adherent by the whole of its anterior surface to the sides of the abdominal opening; and in the thinned anterior uterine wall was an irregular aperture traversed by the polypus, the pedicle of which was connected with the left side of the uterus. The muscular substance of the remainder of the uterus was much hypertrophied. MM. Danyau, Nélaton, and Huguier, who were appointed by the Society of Surgery to report upon this case, regarded it as unique; only three others bearing the least resemblance to it being known. The first of these was reported by Roux, and in it the polypus worked its way through the upper and posterior part of the vagina, becoming lodged between this canal and the rectum. In the second, published by A. Bérard, the tumor traversed the posterior wall of the vulvo-uterine passage, and was expelled through the perineum. While in the third, a case of Lisfranc's, the polypus perforated the recto-vaginal septum, and made its way into the bowel.

But either of such events are too exceptional to influence our practice generally. Hence the real question is, how the polypus may be best removed?

When the tumor is in the vagina, I believe that no operation in obstetric surgery is easier to perform, or less likely to be attended with dangerous consequences, than that of cutting through the pedicle with a pair of curved blunt-pointed scissors. I have not only thus removed almost all the growths of this kind which have fallen under my observation, but I have seen other physicians adopt the same practice with the best results. There has been, in short, neither hemorrhage nor any other unfavorable symptom. At the same time, if the practitioner be nervous, or if the neck of the growth be unusually large, there can be no harm in using the écraseur armed with copper wire, in place of the scissors or bistoury. But to place a ligature around the neck of the tumor, and gradually to tighten this cord until at the end of some days the semiputrid polypus comes away, seems to me a practice which can no longer be defended. There is but one caution to be added with regard to excising the tumor, and it is this: that before using any cutting instrument the sound must be fairly introduced into the uterine cavity; so that the practitioner may feel thoroughly convinced that he has to deal with a tumor, and not with an inverted womb.

Now although nothing can be more simple than the treatment of uterine polypus when the growth has been expelled into the vagina, and is merely attached by a pedicle, yet the removal of the tumor is not so easy when it is still retained in utero. Under these circumstances, the os and cervix have to be thoroughly dilated with sponge or sea-tangle tents (F. 426). The best plan of using these instruments is as follows: The patient, having had her bowels freely operated on a few hours previously, is to lie at the edge of the bed in the ordinary position for labor. A sea-tangle tent, of such a size that it will pass easily, is then introduced up the whole length of the uterine cavity. This tent should be left for twenty-four or forty-eight hours, the latter being preferable. At the end of the time it is removed, and one of a larger size introduced; this being taken away in its turn, and another used, until the finger will readily enter the uterus. The tumor and its attachments can then be thoroughly explored; and if it appear probable that the growth may be successfully removed we ought to proceed to induce further dilatation, supposing it seems to be required. I am sure it is bad practice to attempt extraction of the polypus until the os uteri be sufficiently dilated. For the stretching of the os at the last stage, a sponge is better than a tangle tent; since the former expands more readily than the latter, and does not exert as much force. When sufficient room has been obtained, I have generally removed the tumor by torsion, or by gradually breaking down its attachments with the finger-nail; but if there be a distinct pedicle, and if it be thick, then it had better be divided by the wire écraseur. Should there be any difficulty in introducing this instrument, a whipcord ligature may be applied by means of Gooch's canula provided with a windlass; so that the ligature may be made to cut through the neck of the growth at once, or at the latest on the following day. The growth being separated, it can readily be withdrawn by seizing it with the vulsellum forceps; patience and skill being employed instead of force. The patient had better remain in bed for a few days after the operation, until the uterus seems to have contracted to its normal size. Since I published some cases illustrative of this plan of treatment about eight years ago,* I have adopted it in several other instances with success. The practice, however, is not devoid of danger. In one of my cases there were two intra-

* The London Medical Review, vol. ii, p. 8. London, 1862.

uterine growths of considerable size. One of these, the largest, I removed without much trouble, and with great relief to the patient's sufferings. Some months afterwards, on attempting to separate the second growth from its attachments, death took place, apparently in consequence of pyæmia.*

* As examples of successful cases, the following may be deemed worthy of attention:

Case 1. Caroline R , æt. 40, single, is a dressmaker, and resides in London. Consulted me for the first time on August 27th, 1858, owing to her courses being very abundant. She stated that she had suffered from menorrhagia for more than eight years; but although she had received advice from several practitioners, only temporary relief had been obtained. Is of a deadly pale color, and very weak. The catamenia come on every fortnight, and last for ten days, so that she is hardly ever free. Medicines of an astringent kind check the flow as long as she takes them, but directly they are discontinued she gets as bad as ever. On making a careful vaginal examination, I could find nothing wrong. The uterine sound passed two and a half inches; and I entered a note in my case-book that the uterus was healthy, and that it was a case of menorrhagia from anæmia. The ammonio-sulphate of iron in ten-grain doses was ordered, and under its use there appeared to be improvement in all respects; but on going into the country, and trying to leave off this medicine, her symptoms returned as before. Towards the end of October she came to me again, with her health worse, and the discharge increased in quantity. Seeing that it was necessary to do something to save her life, I proposed to dilate the os and cervix uteri (the former being small and only of the size usual in a virgin) so as to examine the interior of the uterus. I was the more inclined to do this, as I now found that with a little force the uterine sound would pass for five inches; and it is probable that my failing to make it enter the cavity to this extent before was owing to its point having come in contact with the tumor, instead of passing by its side. To the finger the uterus did not appear larger, or heavier, than natural; neither was there any fulness appreciable anteriorly or posteriorly, beyond such as is often caused by the congestion of a monthly period. After a little preparatory treatment, I began to dilate the os uteri; and by means of sponge-tents and the use of a dilator, I found at the end of three days that my finger would enter the uterine cavity. There was at this stage no difficulty in detecting a fibrous tumor attached by rather a broad pedicle to the fundus of the uterus. Larger sponge-tents were then employed still further to expand the os; and as the cervix uteri appeared gradually to melt down, so the tumor presented itself at the mouth of the womb like a small fœtal head. On October 31st, after a great deal of manipulation, the tumor was drawn out of the uterus, and its attachment destroyed by twisting and scratching with the nail. After its removal, the growth was found to be about the size of a turkey's egg. The patient rapidly began to improve, so that on November 12th I ceased to attend her. I saw her in August, 1859, when she reported herself as having enjoyed good health since the operation, and as being regular once a month in proper quantity.

Case 2. Mrs. S., aged thirty-six, applied to me in May, 1859, to be relieved from a tumor almost the size of a hen's egg, growing from the left vaginal labium, as well as from a stricture of the urethra from which she had suffered for some years. With difficulty a No. 1 male catheter was passed into the bladder; but by daily using a larger instrument a No. 12 could be easily introduced at the end of a fortnight. She was instructed to pass a large-sized catheter once in every two or three weeks, to prevent re-contraction. The growth from the labium was removed by the bistoury without any trouble. During this treatment it was noticed that on two or three occasions she had a discharge of blood from the uterus; while on questioning her, it was found that the courses had lately been very abundant, and had come on too frequently. On examination the uterus could be felt enlarged; and as there appeared to be some growth in the cavity, I determined to dilate the os uteri with sponge-tents. On June 18th, I was enabled to pass my finger into the cavity of the uterus, and to detect a tumor as large as a small orange. It seemed attached in its whole length to the posterior surface of the uterus; and as the adhesions were broad and firm, I thought it dangerous to attempt its removal. The patient went into the country, and was not seen again until December 20th; when I was sent for owing to a severe attack of flooding, which had then lasted for five weeks. She was so exhausted that it was necessary at once to check the bleeding, and, therefore, the vagina was tightly plugged with cotton-wool, while astringents with stimulants were freely administered. The hemorrhage was almost entirely checked by these means until the next catamenial period, when it was again abundant. It was there-

3. CYSTS OF THE UTERUS.—Unilocular cysts, or closed sacs, filled with mucus or serum, are occasionally developed either in the substance of the uterus, or beneath the internal mucous coat, or just under the external serous covering. Sometimes one portion of the uterine structure is invaded by a cystic growth, while another part is the seat of an ordinary fibroid tumor.

The *mucous* cysts have their origin in the follicles about the os and cervix uteri; and they are found to have their seat immediately beneath the lining membrane, or in the muscular substance. They are either single, or several can be developed; and their size may vary from that of a large pin's head to that of a small pear. Not uncommonly the lips of the cervix are studded with them. They are occasionally found projecting through the os; but they may also, instead of passing downwards, extend upwards into the cavity of the womb. This latter direction is possibly most commonly taken in the case of women who have borne several children; obviously because the resistance which is offered to such a route is less than in instances where

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fore decided that another attempt should be made to remove the cause of the trouble; and consequently, on January 21st, 1860, a sponge-tent was introduced. On the following day a larger tent was used, so that on the 23d a couple of fingers could be introduced into the uterus. Dr. Armitage then administered chloroform, while I separated the adhesions between the tumor and uterus with my finger as far as could be reached; so that I was then able with Gooch's canula, to pass a whipcord ligature around the tumor at about its middle. This ligature was daily tightened until the forenoon of the 28th, when it broke. Thereupon I managed to get a firm hold of the partly decomposed portion of the tumor by means of a pair of vulsellum forceps; and after using traction with a slight twisting movement for about half an hour, I was able to separate the whole of the growth from the uterus, and remove it. The operation was quickly recovered from without any unfavorable symptom. On February 28th, 1861, this lady remained in good health, the catamenia being regular, and lasting only for three days. Since this date the change of life has occurred, and there has been no illness of any moment. She still (March, 1869) passes the catheter about once in ten days, to prevent any return of the urethral stricture.

Case 3. Mrs. H., ætat. 25 (?), married some years. Never pregnant. On March 10th, 1867, I met Dr. Cream of Putney in consultation; this gentleman having been in attendance for some time owing to the occurrence of severe floodings. For several weeks past Mrs. H. has had more or less hemorrhage every day. Is very low and blanched All known styptics have failed to do good. A vaginal examination revealed no disease: the uterus was not increased in size or weight, and the os was like that of a virgin. March 11th, I introduced a sea-tangle tent; on removing which, on the following afternoon, a small fibroid was found. It had no pedicle; but was just separated with the finger-nail from its uterine attachments and extracted. This operation was not concluded an hour too soon. The exhaustion from the long-continued bleeding was so intense that much difficulty was experienced in keeping the patient alive. She was nursed, as well as attended, by Dr. Cream for some days; and to his constant care her complete recovery, at the end of several weeks, was due.

Case 4. Mrs. E., ætat. 32, married eight or nine years: never pregnant. Has had menorrhagia for six years: for many months there has been severe metrorrhagia. Has been told in the country that she has cancer. I saw her on December 4th, 1867, with Mr. Chandler of Finsbury, and with Mr. Coates. She was of the color of wax, and could scarcely sit up in bed without fainting. An examination revealed the presence of an enlarged uterus: the sound passed five inches, and with it I could distinguish a tumor in the uterine cavity. Seeing the urgency of the symptoms, I visited the patient again the same night; and then, assisted by Messrs. Chandler and Coates, I dilated the os uteri—at first with an instrument having separable blades like a lithotrite, and afterwards with Barnes's india-rubber dilators. After some short time the os was sufficiently patent to enable a fibroid tumor with a rather broad attachment to be detected. What with torsion, separating the growth from the uterine wall with my nail, and extractive efforts, the mass was removed. It was about the size of a small potato. On January 31st, 1868, she called to show herself quite well, and about to return home.

fecundation has only occurred once or twice some long time previously. After such cysts have passed into the cavity of the uterus, their attachment seems occasionally to become pediculated; while subsequently they may be expelled with all the symptoms which attend upon an abortion. On one or two occasions where this has happened, I have been so struck with the resemblance borne by the tumor to a small hydatid cyst, that search has been made for the echinococci heads; though, of course, nothing of the kind has been discovered. The vesicles or cysts which not very unfrequently result from a morbid alteration of the villi of the chorion, and which lead to the formation of the "vesicular mole," might likewise, if they were expelled singly, give rise to an erroneous diagnosis; but as they almost always come away in masses, as their formation is attended with (or preceded by) the symptoms of pregnancy, and as the indications of their presence are well marked and characteristic, it is scarcely possible for them to be mistaken for the cysts under consideration.

In an excellent essay on "Cysts of the Womb," by M. Huguier,* it is shown that each of these growths has two envelopes: first, an internal one, which is smooth, polished, transparent, excessively thin, and very vascular; and secondly, an external membrane, composed of elastic areolar tissue, thicker than the first tunic, and like it transparent. The fluid in these bodies is albuminous, unctuous to the touch, stringy, alkaline, clear, and transparent,—in short it resembles the mucus secreted by the follicles of the cervix. Occasionally it is slightly opaque, and sometimes it contains one or two little grayish or yellowish-white bodies which vividly reflect the light. A microscopic examination of the liquid by MM. Huguier and Robin, has shown that it contains a quantity of molecular granules, as well as spherical or ovoid granular globules formed by the agglomeration of the molecular particles. The uterine tissue around the cysts, as well as the mucous membrane covering them, is generally somewhat congested; while the entire cervix is frequently hypertrophied.

The formation of these cysts takes place more rarely than might be expected. Their growth is slow; while as they occupy parts of feeble sensibility they give rise to no appreciable symptoms in the early stages of their development. But when they have attained a certain size they produce uterine leucorrhœa, irregular with too abundant menstruation, and often attacks of hemorrhage. Pains in the loins and upper part of the thighs are complained of, frequently there is a sense of bearing-down, and in exceptional instances the growth is thrown off with the symptoms which are produced by the expulsion of an early ovum or of a polypus. An examination may fail to detect the cyst if it be situated in the substance of the uterus, or if it project into the canal of the cervix without causing dilatation of the os uteri; but where the latter is patulous, or where the cyst projects from the external surface of the neck, it will be found as a somewhat supple and imperfectly fluctuating, or as a firm and elastic body. When the cyst occupies the cavity of the uterus, the body of this organ will be appreciably enlarged, and feeling as if occupied by a fœtus or fibroid tumor; the diagnosis being difficult until the os and cervix have been dilated, so that the growth can be reached with the finger.

The treatment consists in making a sufficient incision into the mucous cyst, with the assistance of the speculum; or in having recourse to an incision with the application of caustic to the walls; or in snipping or twisting off the growth if it be at all pedunculated. These cases ought never

* Mémoires de la Société de Chirurgie de Paris, tome i, p. 253, et seq. Paris, 1847.

to be allowed to end fatally, or even to injure the general health; because in any instances of uterine disease where there is constant leucorrhœa, with occasional attacks of hemorrhage, and a small healthy os uteri, the latter should be dilated with sponge or sea-tangle tents (F. 426). After this stretching has been fairly accomplished, the removal of a dead ovum, or of a mass of hydatids, or of a pediculated fibroid or cystic tumor, becomes comparatively easy.

The *serous* cysts may be developed in the subperitoneal areolar tissue, or very rarely in the muscular substance of the uterus. They are probably of more frequent occurrence than the mucous bodies; but their presence is ascertained with greater difficulty during life, inasmuch as they grow from the external or abdominal surface of the uterus, while they give rise to no symptoms of any moment unless they happen to press upon the rectum or bladder. It is very probable that not a few of the cases of floating abdominal tumors, which are every now and then met with, consists of these cysts with a long pedicle; while it is also not unlikely that some of the instances of ovarian tumor, that have been recorded as cured by spontaneous rupture into the peritoneum, have really been examples of uterine cysts. The largest growth of this kind with which I am acquainted, occurred in a patient long under my care for severe uterine hemorrhage, due to a fibroid tumor seated in the posterior wall of the uterus. In this case, the post-mortem examination revealed the presence of an oval cyst, formed under the peritoneum, which was stretched upwards from the fundus uteri; and as the growth was supported upon the expanded wings of the iliac bones, the uterus had been almost kept out of the true pelvis by it. The sac measured nine inches in breadth, and contained about a pint and a half of urinous-looking fluid.*

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* The points of interest in this case are sufficiently numerous to excuse the introduction of an epitome of the patient's history: Mrs. H., æt. 34, a fine, stout woman, first applied to me on June 6th, 1855. She stated that she had been married some years, and thought that she had been pregnant twice, but had miscarried each time at an early period; though subsequently she believed this opinion to be erroneous. The catamenia first became more abundant than usual in 1852, but it was only about the middle of 1854 that frequent and prolonged attacks of flooding were experienced. During the few months preceding her application to me, the hemorrhage had been on constantly, so that she had an exsanguine appearance and was very feeble. The abdominal parietes were so loaded with fat that it was difficult to learn the condition of the viscera; but there was greater fulness over the hypogastric region than elsewhere, and such a sense of resistance as would be communicated by a solid tumor. Per vaginam the uterus was found very high up, and almost out of the pelvic cavity, so that the cervix could scarcely be reached. The os uteri was seen by a long speculum to be very contracted, while repeated attempts to pass the smallest-sized bougie through the cervix was unsuccessful. The diagnosis made at this time was to the effect that there was some small foreign body in the cavity of the uterus, and some ovarian or uterine tumor occupying the lower part of the abdomen. From the month of June, 1855, until the day of her death, December 27th, 1860, she was constantly under my care. No medicine had any effect in controlling the hemorrhage but mercury: every ordinary astringent failed completely. Owing to the obvious difficulties presented, any attempt at dilatation or incision of the os and cervix uteri seemed impossible. During the last few months of her life she became much exhausted by the long illness; while she also suffered from great irritability of the stomach, so that there was sometimes an inability for several days to take stimulants and nourishment except in the form of enemata. She gradually became weaker but did not lose flesh, and at length sank exhausted on December 27th, 1860. At the autopsy the body was found quite bloodless. The adipose tissue on the abdominal walls was two inches in thickness, while the vaginal labia looked like large folds of fat. The lower part of the abdominal cavity was occupied by an oval cyst about nine inches broad, which was apparently formed under the peritoneum, stretched upwards from the fundus uteri. It contained about a pint and a half of urinous-

When these serous cysts are detected during life, and when they give rise to troublesome irritation of the rectum or bladder, they should be cautiously punctured either with a bistoury or a trocar and canula.

IX. DISPLACEMENTS OF THE UTERUS.

The displacements to which the uterus is liable have excited the attention of practitioners of medicine since the days of Hippocrates. It is only in the present century, however, that the different flexions and versions to which the non-pregnant womb is subject have been determined and distinguished from each other; while now in the second half of this century, we are employed in discussing the pathological significance of these displacements. The history of these questions is just a repetition of that which has happened over and over again. First, the occasional occurrence of some morbid state of the body is described, and after a considerable interval generally recognized. In the second term, the gravity of this condition is overestimated, and its treatment often conducted with unnecessary severity. During the third period, the importance of the disorder is unduly depreciated; while the few practitioners who think such excessive depreciation an error, and who attempt to remedy the malady, are often ungenerously censured. And then in the fourth stage, "spirited discussions" (as many exhibitions of bad taste and imperfect knowledge have been euphoniously called) gradually cease; the disease being allowed to drop into its proper position in the practice of physic. This last epoch has yet to be reached by some of the affections now to be described. To say that prolapsus and procidentia, flexions and versions, can now and then exist without giving rise to any symptoms of moment, is undoubtedly true; but it would be very incorrect, in my opinion, to argue that these conditions of the womb are, therefore, unimportant, or that they are not often the source of daily annoyance and discomfort, or that they do not readily lead to serious and painful complications.

1. PROLAPSUS AND PROCIDENTIA.—These terms have long been used in practice to designate a descent of the womb as it exists in two different grades. By "Prolapsus" [from *Prolabor* = to glide forward] is meant that condition in which the uterus falls below its natural level in the pelvic cavity; while by "Procidentia" [*Procido* = to fall down] is signified the protrusion of the uterus beyond the vulva. The causes of both conditions are the same: the symptoms vary but little save in degree.

Causes.—All women are liable to a falling of the womb; but it occurs most commonly after the age of thirty-five in such as lead a laborious life.

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looking fluid, while there was also a smaller cyst holding two drachms. By means of the large cyst, which rested upon the expanded wings of the iliac bones, the uterus had been kept out of the pelvic cavity. On examining the cavity of the womb it was found to contain a fibroid tumor of about the size of a very small orange cut in half. The tumor was seated in the posterior wall of the uterus, its base or attachment being its broadest part. The other organs of the body were healthy. The preparation, showing the cyst and tumor, has been placed in the museum of University College. A more detailed report of the patient's history, together with an excellent sketch of the uterus with the tumors, by Dr. Westmacott, has been published in the Transactions of the Obstetrical Society of London, vol. iii, p. 11. London, 1862.

Hence, cooks and laundresses and market laborers often suffer from it, and next to these, perhaps, are nurses. Women who have borne children are more frequently affected than those who are sterile; while lingering or instrumental labors especially predispose to it. Amongst other causes also must be enumerated all those conditions which tend to increase the weight of the uterus, such as congestion, hypertrophy, subinvolution after labor, tumors, &c.; violent bearing-down efforts, such as are made during parturition, in straining to pass hardened fæces, or in urging an evacuation through a stricture of the rectum; and forced respirations, particularly those used in coughing, the lifting of heavy weights, &c.

The immediate causes of the displacement may be said to be the pressure on the uterus by the superincumbent viscera, combined with a diminution in the tone of the uterine supports. Consequently, prolapsus or procidentia is prevalent among women who have a preternaturally shallow and capacious pelvis; in the sufferers from ascites and ovarian dropsy; in delicate flabby subjects, where the vaginal walls are relaxed, and the broad and round ligaments unbraced and elongated; as well as in cases where the perineum has been lacerated and the torn edges have not reunited. Very rarely we find procidentia during the early months of pregnancy; the uterus, however, as it subsequently rises out of the pelvic cavity, assuming its normal position.

Symptoms.—The uterus can seldom fall to any extent without giving rise to much discomfort. Complaint is generally made of a sense of fulness or weight about the pelvis, of dragging or bearing-down pains, of a wearisome backache, and of a leucorrhœal discharge. Menstruation is seldom interfered with; there is no impediment to conception, since even in most cases of procidentia the uterus goes back by itself or is easily pushed up when the patient is in bed, and the general health is not directly affected. The extent to which the bladder and rectum suffer, in consequence of the pressure of the displaced womb, varies very much independently of the amount of displacement. In some few instances there is a complete inability to pass water until the patient lies down and replaces the uterus with her fingers, while in other cases micturition may be annoyingly frequent. Constipation is often complained of, and if the woman be careless a large accumulation of fæces may take place in the rectum.

By a vaginal examination, in cases of prolapsus, the uterus is found depressed from its normal site, being often so low that it rests upon the perineum. The detection of the os uteri, at the inferior part of a cervix of the natural length, prevents any error in diagnosis. In procidentia uteri a round or pear-shaped tumor, of variable size, is seen projecting beyond the vulva, the mouth of the uterus, often somewhat dilated and covered with thick mucus, being visible at the centre of the lowest part of the tumor. It is always advisable to introduce the sound so as to learn whether the depth of the uterine cavity is increased beyond its normal extent of two inches and a half, as well as to make sure that the opening is not a mere cleft in a polypoid growth. The labia uteri frequently present excoriations, or even rather deep ulcers, produced by friction with the clothing and the irritation of the discharges. The epithelium of the vaginal mucous membrane is also dry, and harsh, and cracked, while sometimes there are one or more ulcers, looking as if portions of the mucous lining had been punched out.

Treatment.—The general principles may be summed up in a few directions: afford artificial support to the superincumbent abdominal viscera; give tone to the round and broad ligaments of the uterus, to the relaxed vaginal walls, and to the perineum; and remove any complications which

can favor the falling, such as uterine congestion or hypertrophy, cough, constipation, &c.

Before speaking of the best mode of carrying out these indications, a remark or two must be made as to the way in which a procident womb is to be replaced. With the great majority of cases there is no difficulty in effecting reposition. It is merely necessary to put the patient on her left side, with the legs well flexed, and then, having thoroughly oiled all the parts, to push up the uterus so as to allow this organ in its ascent to draw in the vagina. Supposing this plan to fail, it will be well to repeat the attempt while the woman rests upon her hands and knees, with her head much lower than her pelvis, in which position the downward pressure of the intestines must be removed. And still, success not following, the procident uterus should be firmly encircled with strips of adhesive plaster, reapplying them every forty-eight hours, while the patient is to be kept quiet in bed for a few days until the circumference of the tumor is sufficiently reduced. Immediately after the removal of the strapping, the uterus will almost certainly be replaced with ease. Dr. McClintock has recorded a case where, the procidentia having existed continuously for four years, he was unable to effect reposition until he had thus compressed the uterus and vagina by four consecutive strappings. In a remarkable instance, where this plan was not tried, and where the uterus was passing into a state of sphacelation although it had only been down three or four days, Mr. T. F. Edwards applied a whipcord ligature around the neck of the tumor. On the following day a fresh ligature was put on, while the parts below it—consisting of the whole uterus—were excised. Seven days subsequently the ligature came away, and in another fortnight the patient (who was 74 years of age) was walking about the streets of Denbigh to the astonishment of her surgeon and friends. The first symptoms of displacement had been observed twenty years previously, and there had often been some trouble in replacing the womb. Three months after the operation she appeared in good health.*

Returning to the subject of general treatment, attention must be directed to the importance of affording support to the abdominal viscera, a point which is too often neglected. Now support may be given in many ways. Where the patient is poor, she can generally be directed how to manufacture a belt of common jean, making it to lace behind, instructions being given that it is to be so constructed as to produce pressure from below upwards, while it ought to be comparatively easy above. A couple of bands, covered with wash-leather, are fastened behind so that they may be brought under the perineum and then buttoned to the jean in front. These bands prevent the belt from riding upwards, while a pad covered with oil-silk should be fitted on them, if necessary, to give support to the perineum. A much more perfect instrument is known as Hull's "Utero-abdominal Supporter," which forms an excellent abdomino-perineal bandage. Mr. Bigg has also contrived a very useful kind of abdominal plate, which is fixed with steel bands something like a double truss.

To give tone to the uterine ligaments and vagina, a nourishing diet with strengthening medicine ought to be prescribed. Every practitioner has a preference for some particular kind of tonic, and my predilection is in favor of a combination of nitric or phosphoric acid, nux vomica, and bark (F. 376). Of the various ferruginous preparations none are superior to the common tincture of perchloride of iron (F. 380, 392). Locally, recourse is to be had to astringent vaginal injections (F. 425); or to astringent pessa-

* British Medical Journal, p. 147. London, February 6th, 1864.

ries (F. 423), which have answered admirably in my hands. In mild cases, tannin pessaries will almost alone effect a cure; but care must be taken that they do not set up too much irritation, and that their remnants are not allowed to accumulate in the vagina. Cold salt-water hip-baths are also to be recommended. Where the mucous membrane is ulcerated, the application of nitrate of silver proves very serviceable.

Three special methods of giving relief in these cases yet remain to be considered. And, first, with regard to mechanical pessaries, I would say that they have only seemed to me to be required in very rare instances. They are indeed clumsy inventions, mostly of use for concealing the practitioner's want of skill. But some poor women do not ask to be cured; they are unable to give the necessary attention, and all they desire is that they may still work as laundresses, cooks, market gardeners, &c., without a day's cessation. Under these circumstances the womb may be kept up by a well-adapted pessary. Many various kinds of instruments are sold: the best being Hodge's lever oblong ring or horseshoe pessary, the oval vulcanized india-rubber pessary, the common elastic air pessary, and that known as Zwanke's pessary. This latter support is made of two oval plates of tin, united at one extremity by a hinge. On each side of the hinge, upon the lower surface of the plates, there is a metallic stem. These stems, on being widely separated from each other, carry the oval plates face to face, thus allowing the instrument to be closed and easily introduced. Then by bringing the stems in contact, the plates are separated, so as to form an expanded surface like a pair of wings; this position being maintained by a screw which holds the stems together. Mr. Coxeter has somewhat modified this instrument for me, by substituting strong wires interlaced, for the oval plates; so that while the pessary is worn the patient may still use astringent injections, and thus hope for an ultimate cure. Whatever pessary, however, is employed, the patient should be impressed with the importance of frequently removing it. The most offensive task I ever had was to extract an impacted boxwood pessary, which had been worn continuously since its first introduction two years previously. It was impossible to get it away without breaking it to pieces, and the stink from the matters which had accumulated in its interior was exceedingly disgusting. Moreover, several weeks elapsed before the ulcerations which the pressure of this globe had produced upon the vaginal mucous membrane were healed; and even then it was found that the procidentia remained uncured.

The second method aims at a radical cure, and consists in subjecting the patient to a somewhat severe surgical operation. The plan, originally known as Marshall Hall's, is to dissect off one or more longitudinal strips of the vaginal mucous membrane, and then to bring the edges of the wound together with sutures; so that after the surfaces have healed, the calibre of the canal will be found diminished in proportion to the extent of tissue removed. The strips ought to be somewhat wedge-shaped, the apices being towards the meatus urinarius; while by some surgeons it is thought better to remove a slip from each side of the vagina, rather than to take a very broad one from only the anterior or posterior surface. In the very few instances in which I have resorted to this procedure, the result has been successful; but it must be remembered that it is an operation not free from danger, and that the after-treatment is somewhat tedious. Drs. Marion Sims and Emmet have improved upon this procedure by denuding a V-shaped portion of the tissue, with a transverse line of scarification to unite the two arms; the raw surfaces being brought into contact by silver wire sutures. This operation (elytrorrhaphy) has to be followed by perfect rest

in the horizontal posture, with the repeated use of the catheter; while opium is given to relieve pain, as well as to procure constipation. The sutures through the angle of the V, next the urethral orifice, are removed at the end of nine or ten days; the upper ones being withdrawn about four days later.

A third proceeding, which has been extensively practiced, and which I formerly resorted to more frequently than I do now, consists in partly closing the vulvar opening: so that if the uterus afterwards descends it falls upon an elongated perineum, instead of escaping externally. The mucous membrane from part of the sides and posterior wall of the lower part of the vagina is cleanly dissected off, an extensive horseshoe-shaped raw surface being formed. Quill or clamp sutures are then employed to keep the opposite surfaces in close contact, and the edges of the wound are brought together with a few superficial sutures; the former being removed about the sixth or seventh day, while the latter are allowed to remain for a couple of days longer. This operation is principally adapted for those cases where the perineum is more or less deficient, owing to some rent having occurred at the time of labor; but where there is a healthy perineum it has seemed to me very often to fail. At all events, I have not succeeded to anything like the extent I had anticipated; and cases have come under my care of bad procidentia, although the perineum had been thus legthened some months previously by surgeons of great experience. And this is not surprising. For it must be remembered after all, that the perineum has but little to do in preventing uterine depression; inasmuch as it is sometimes seen completely ruptured without any procidentia occurring, while it may be perfectly natural in some of the worst forms of descent. I have even observed a firm and large hymen coexistent with procidentia, as in the following case: On June 3d, 1864, C. P., aged 41, single, with the catamenia regular, and following the occupation of a nurse, consulted me for a falling of the womb, from which she had suffered for three years. To my surprise I found a small cervix uteri completely protruded, there being also a tough and extensive hymen. The cervix, which appeared constricted, was gently pushed upwards into the vagina; the opening in the hymeneal membrane being then felt so contracted that it only admitted the finger with pain. A complete cure was effected by using the tannin pessaries, while a slight abdominal belt was worn.

In conclusion, it is necessary to warn the practitioner against placing much reliance upon those reports of cases of procidentia of the uterus, which only show that the patient leaves the hospital "cured." For this term can never fairly be applied unless she remains well for several weeks after resuming her customary occupation. To assert that a woman is cured, because her womb does not descend when she has just undergone some operation, and has had a month's rest in bed, is as great an abuse of language as to say that a sufferer from mammary cancer is cured, because her breast has been amputated, and the wound has healed.

2. RETROFLEXION AND ANTEFLEXION.—The condition known as retroflexion [*Retro* = backwards + *flecto* = to bend] consists of a bending back of the uterus at the part where the neck joins the body; so that the fundus is found between the cervix and rectum, the os uteri being in its normal position. The uterus, indeed, becomes shaped like a common retort. In anteflexion [*Ante* = forwards + *flecto*] we find the fundus pressing upon the bladder. Considering that in the natural condition of the nulliparous womb this organ is slightly inclined forwards, it might be expected that in after-life cases of an exaggerated degree of anteflexion would

be much more commonly met with than examples of retroflexion. And according to some authorities this is the fact to a marked extent; although in my own practice it has been the very reverse. Without explaining the circumstance it is certain, that for every case of anteflexion about which I am consulted, I see five or six of retroflexion; and this has been my experience for several years. Displacement of either kind is rare in virgins.

Causes.—The displacements under consideration may result from the fundus being top-heavy, owing to the presence of a fibroid tumor in either the anterior or posterior wall of the uterus, or of a polypoid growth in the uterine cavity. Prolonged congestion also probably acts in the same way. Any weight upon the fundus—whether this be due to an abdominal tumor, or a fecal accumulation, or tight lacing forcing the viscera downwards, will produce displacement. Relaxation of the proper tissue of the uterus is not an uncommon cause of retroflexion; and therefore we meet with this displacement in cases of too frequent childbearing, in fatty degeneration of the uterine walls, in delicate women suffering from menorrhagia, and in women who become exhausted through excessive sexual intercourse. The false membranes formed in pelvic peritonitis are, now and then, the cause of these deviations owing to their shrinking like cicatrices elsewhere. Irregular contraction of the uterus, especially after abortion, often produces backward displacement; while the latter is certainly increased, even if it be not sometimes originated, by constipation and the straining exerted to pass hardened fæces.

Symptoms.—Retroflexion may undoubtedly exist without giving rise to symptoms of the least importance. This only happens, I believe, when the displacement is slight and the uterine structures are flabby, or when the pelvic cavity is more than ordinarily capacious. But where the angle of flexion is acute, where the circulation through the uterus is much interfered with, and where the fundus is immovably pressed upon the rectum, encroaching upon its cavity like a firm tumor, I have always found the patient complain of considerable annoyance, if not of actual suffering; annoyance, be it observed, which continues day after day, and is only varied periodically by dysmenorrhœa.

In a typical case of retroflexion, the practitioner's attention is first directed by the patient to a dull, wearying, and constant backache, which is most marked about the sacral region. He will be told that the pain shoots down the thighs, and that the groins are tender. Complaint is also made of a feeling of fulness about the rectum, so that there is an unusually frequent desire to go to stool, although nothing comes away. Moreover, the passage of a motion which is at all constipated aggravates the aching in the back, and perhaps produces pains which shoot through the pelvis. Sexual intercourse is attended with suffering, and is not followed by pregnancy; while just before and after the monthly periods there is so much tenderness that connection cannot be tolerated. The catamenia always come on with pain and difficulty; but about the end of the second day the flow of blood seems to give some relief. There is a more or less abundant catarrhal discharge. The general health is bad; there are frequent attacks of nausea; the appetite is small; the spirits are much depressed; and a train of symptoms is present, which the sufferer has been assured is only due to hysteria. On making an examination, the os and cervix uteri are found in their proper situation in the median line; but encroaching upon the rectum is a round body, exquisitely sensitive to the touch, and which consists of the congested fundus. On touching this part, or on attempting to elevate it, the patient will exclaim that it is the seat of her suffering. Owing to this great tenderness there will be but little difficulty in recogniz-

ing the nature of the case; but in order to be absolutely certain that there is no tumor, the substance must be gently raised with the finger, while the sound is cautiously passed into the uterine cavity. The disappearance of the tumor during the time that the uterus is kept in its normal position, makes the diagnosis certain; but if any confirmation be still needed it may be found in the circumstance that after the withdrawal of the sound the fundus will be gradually felt falling back again.

In the comparatively few cases of anteflexion which I have seen, the general symptoms and the local suffering have seldom exhibited much severity. In fact, such cases would hardly fall under observation, were it not that the pressure of the fundus very commonly produces great irritability of the bladder; so that while the patient is in the erect position the desire to micturate is almost as frequent as in cases of vesical disease. Moreover, although it is not uncommon to find considerable engorgement and tenderness of one or both ovaries in retroflexion, such complications are rare in anteflexion. Sterility is the consequence of both displacements when they are well marked, since at the angle of flexion the canal of the uterus is completely obstructed. Where the uterus is bent and its fundus fixed to the right or left side, the cervix remaining in the median line (lateroflexion), this deviation from the natural position will generally be found to have been caused by some congenital maldevelopment, or to have subsequently originated in an attack of inflammation of some of the pelvic structures—especially of the connective tissue.

Treatment.—Supposing the deviation to be recent, there is a hope that the uterus when replaced by the sound will retain its natural position. In some few cases of retroflexion and anteflexion this happens, and then the patient, by remaining quiet in bed for some twenty-four hours, is enabled to leave it quite well.

But in the greater number of instances the womb falls back almost immediately after it has been replaced. If there be much congestion of the labia and cervix, good results will follow on relieving this hyperæmia by applying leeches to the lips of the womb or by puncturing them. Then, when it is certain that there is no endometritis, a cure may sometimes be effected by the introduction of a stem pessary, by which instrument the circulation through the uterine tissues is allowed to go on naturally, and therefore the fundal congestion gets removed. The intra-uterine stem which I have found most useful is one which has been made by Mr. Coxeter at my suggestion. It is two and a quarter inches in length, and is fashioned somewhat like a flattened silver female catheter, having a slight curve corresponding to the natural bend of the uterus, and terminating at its lowest part in a thin concave plate on which the labia uteri rest. If this instrument produce the least pain, if the congestion of the uterus do not gradually disappear, or if there be any ovarian tenderness, medicated pessaries containing belladonna and the iodide of lead or the mercurial ointment (F. 423), are also employed at the same time. The patient is kept in bed for the first few days, and then gradually allowed to get about; but she is watched during the whole period of treatment.

There are cases, however, where this plan is inapplicable. With such, when the mucous membrane of the uterine canal is healthy, we may resort to the measure suggested by Dr. Moir, of Edinburgh. This consists in dilating the cavity of the uterus with the sponge or sea-tangle tents (F. 426); beginning with a small size, and persevering until the finger can readily enter and explore the cavity. Having satisfied ourselves that there is no foreign body present, the uterus is allowed to contract upon a metallic stem such as has just been described. The stem should be changed every

forty-eight hours, beginning with one of considerable size, and ending with one rather larger than the uterine sound. The stem last used, moreover, had better be worn for some few weeks. Dr. Moir recommends wire pessaries covered with gutta percha, but I have not employed them.

In a third class of cases, where the uterine congestion and tenderness have been very great, or where there have been more or less prominent symptoms of endometritis, I have adopted a practice which I first learned the value of from Mr. Baker Brown. This gentleman, believing that the muscular tissue is not passive in retroflexion, and that there is probably active contraction at the point of flexion, has incised the os and cervix with the hysterotome; dividing the parts freely up to, but not through, that contracted part of the cervical canal usually known as the internal os. I am not quite certain whether Mr. Brown divides the tissues at the angle of flexion, but I have always done so; although the incisions at this point must be made very cautiously, inasmuch as the tissues are often thinner there than in healthy uteri. With the precautions already recommended in using the hysterotome (p. 781), I believe that this operation is almost free from danger, and that if adopted in suitable cases it will effect a cure.

One word of warning must be added as to those rare cases where the uterus is not only displaced, but in which the fundus is bound down by adhesions to its unnatural situation. To rupture these would probably be to excite severe, and perhaps fatal, peritonitis. Should such adhesions be present, they may be diagnosed by the practitioner finding it impossible to elevate the fundus with the finger; while if he attempt to replace the womb with the sound the tearing pain produced will be unbearable. In such cases we shall have to be contented with giving relief by the frequent use of the iodide of lead and belladonna pessaries; two or three leeches must be occasionally applied to the uterine lips when there is evidence of congestion, and the bowels ought to be kept regular by pepsin, the mineral acids, and very simple aperients, so as to prevent any lodgment of fecal matter in the rectum above the projecting fundus.

3. RETROVERSION AND ANTEVERSION.—These displacements are very seldom met with in the unimpregnated state. In retroversion [from *Retro* = backwards + *verto* = to turn] the uterus lies almost transversely in the pelvic cavity, the fundus being towards the hollow of the sacrum, while the os is drawn under the arch of the pubis. The opposite condition, anteversion [*Ante* = forwards + *verto*], is characterized by the fundus lying towards or against the bladder, while the os is found directed to the cavity of the sacrum.

The chief *symptoms* are backache and bearing-down pains. There is usually a leucorrhœal discharge, but this is due more to the cause of the malposition than to the displacement itself. Menstruation is not interfered with, neither is impregnation absolutely prevented. In retroversion the os uteri is seldom pushed forward with such firmness as to press on the urethra, and so give rise to retention of urine, although such an occurrence is very commonly the result of this displacement when the uterus is enlarged by the existence of pregnancy. Nevertheless it may happen that micturition will be impeded, and therefore, if any tumor be felt at the lower part of the abdomen, or if the patient complain of a constant desire to pass water, or especially if the urine should dribble away, the catheter ought to be passed without loss of time.

Supposing the fundus to be inclined to one side of the body while the os uteri looks towards the opposite side (lateroversion), there will usually be obtained a history of previous pelvic peritonitis, unless there has been some

congenital arrest of development causing a neighboring viscus to drag aside the uterus. Under either of these circumstances the malposition is most times incurable. The occurrence of pregnancy in these cases, though not impossible, is surely very improbable.

In the cases of retroversion and anteversion of the non-pregnant uterus which I have seen, the general condition has been one of debility, the muscles especially being deficient in tone, and the vaginal walls much relaxed. The *treatment* has therefore consisted in allowing a nourishing diet, in administering such tonics as quinine and steel and nux vomica (F. 380), or the mineral acids with strychnia and some bitter infusion (F. 378), while locally astringents have been employed, particularly injections of alum and sulphate of zinc (F. 425), or tannin pessaries (F. 423). Cold sea-water baths have proved especially useful. The occasional replacement of the uterus with the sound has also materially assisted the cure.

4. HERNIA OF THE UTERUS.—Hernia of the uterus, or of its appendages, is an accident concerning which the records are very scanty. Of the reported cases, it is remarkable that the greater number are examples of displacement of the gravid uterus. Hernia differs from eventration of the womb in this respect, that whereas in the former case the womb passes through the inguinal or crural opening, in the latter it is forced through some artificial aperture — as between the recti muscles, &c., or through a wound in the abdominal parietes.

Hernia of the unimpregnated uterus can happen at the inguinal ring, or at the crural arch, or through the obturator foramen, while it may probably arise from too great relaxation of the ligaments of the uterus, or from displacement of the uterus by tumors within the pelvis, or from the contraction of bands of false membrane, &c. The diagnosis of this condition from ordinary intestinal herniæ will hardly be very difficult, if a vaginal examination be instituted, though without this a mistake is not unlikely to be made, since the symptoms may at times resemble those due to strangulation of the intestines. An examination of the recorded cases of uterine hernia shows that pregnancy can occur, and full development of the fœtus take place, while the uterus remains in its abnormal position. The treatment of such an accident must depend very much on the length of time which has elapsed since its occurrence, and on the nature of the symptoms. When recent, it would seem not unlikely that cautious attempts at reduction might be attended with success, although supposing the manipulation to be fruitless, an operation would scarcely be justifiable unless there happened to be severe suffering and constitutional disturbance.

The protrusion of the gravid uterus at the umbilicus has been met with more frequently than any other variety. Dr. Evory Kennedy says that he met with a remarkable example in a woman who had borne a number of children. When in labor of her second child, hernia took place at the umbilicus, which gradually increased in extent with each child she carried, until at length the impregnated womb made its way completely out of the abdomen, and became suspended over the pubes, so that at the end of the ninth month it hung down as low as the knees.

I believe that no instance of hernia of the gravid uterus at the inguinal ring is known to have occurred in our own country, and probably not more than five or six examples are to be found recorded in medical literature.

5. INVERSION OF THE UTERUS.—Not a few practitioners pass through a long and busy life without ever meeting with a case of uterine inversion. The uterus, in this accident, is literally turned inside out. The

fundus descends through the os uteri, so that the mucous lining of the cavity of the womb becomes the external covering of the tumor, which projects into the vagina and generally through the vulva.

The uterus may be inverted immediately after labor, either from delivery occurring unexpectedly while the patient is in the erect posture, or from irregular contractions of the uterine fibres, or from the practitioner making violent traction on the funis to remove the placenta.*

The fundus of the uterus will now and then become much depressed directly after parturition, although complete inversion does not follow for many hours or even for a few days until some irregular contractions have forced the fundus and body quite externally. These cases are sometimes spoken of as examples of *spontaneous* inversion, the accident occurring independently of any interference on the part of the practitioner.

Cases of inversion have also been observed quite independently of parturition. Thus, a polypus attached by a very short pedicle to the fundus uteri having been expelled into the vagina, the womb has become inverted owing to the continuance of the forcing pains. An excellent example of this occurrence can be seen in the Hunterian Museum—Preparation 2654. Or again, straining efforts like those of labor have been set up by a fibroid tumor, and the uterus has been inverted so that the growth could be seen projecting from the uterine wall.

The symptoms which immediately result from inversion are those of severe nervous shock. There are also bearing-down pains, nausea and vomiting, and cold sweats; together with a rapid feeble pulse, and perhaps hemorrhage. Where the placenta has come away prior to the accident, the latter may escape detection; the symptoms probably being attributed to the hemorrhage. Under these circumstances, death has occurred from exhaustion without a suspicion as to its cause; until the nature of the case has been revealed at the autopsy. Or the patient has gone on for months, or perhaps for years, suffering from very bad health, anæmia, repeated attacks of hemorrhage, nausea, &c., without the cause being surmised until a proper vaginal examination has been made. And even then, at least some nine or ten cases are known where the inverted womb has been mis-

* The examples of inversion which have been under my own observation are the following: The *first* case happened on July 2d, 1860, when I received a note asking for my immediate attendance, as "a large tumor had been spontaneously expelled from the womb directly after the birth of the child." The gentleman who had effected delivery thought the tumor might be ligatured, or at once cut off with advantage. On examination the uterus was found completely inverted, with the placenta attached. The patient was very faint, but on peeling off the after-birth only slight difficulty was experienced in effecting reposition. She recovered favorably.

The *second* instance occurred on August 2d, 1860. The patient, a primipara, was attended by an experienced student from King's College Hospital. On the birth of the child there set in considerable hemorrhage, and while the accoucheur was attempting to check the flooding by removing the placenta, the uterus became completely inverted. I took away the placenta, reduced the inversion, and the patient did well.

The *third* example was met with on February 28th, 1868. Mrs. ——, nineteen years of age, was delivered of her first child at the end of the eighth month of gestation. Directly after the removal of the placenta Dr. O'Flaherty discovered that the uterus had become inverted. On my arrival about an hour afterwards, I found the patient much prostrated. There was complete inversion, the uterus being between the patient's thighs. The placenta had evidently been attached to the fundus. Owing to the flabby nature of the organ (it seemed almost as if there were advanced fatty degeneration), great care had to be taken in effecting reposition, which was, however, accomplished. But within an hour afterwards the exhaustion rapidly increased, and the patient sank in spite of the liberal administration of stimulants.

taken for a polypus; the error not having been discovered until after the organ has been excised, or a ligature placed around it. No false diagnosis can be made, however, if the relations of the tumor to the os uteri be observed. For on passing the finger, or the sound, upwards along the tumor, a cul-de-sac will be found all round its neck; so that the instrument will not penetrate between the tumor and the os uteri for more than about half an inch. If the inverted womb be protruded beyond the vulva, the rough and bleeding surface of the body will proclaim its nature. Moreover, if further evidence be needed, the orifices of the Fallopian tubes may be sought for and a probe passed for some little distance into each canal.

Supposing that the uterus is inverted with the placenta attached, the latter organ had better be peeled off before attempting reposition. It has been thought that by adopting this practice, the risk of hemorrhage would be increased; but independently of the great advantage derived from lessening the bulk of the womb, the danger is more imaginary than real. Then the uterus should be grasped as firmly as possible, and steady long-continued pressure made in an upward direction, so as to reduce that part first which has last descended. The inhalation of chloroform or some other anæsthetic can generally be allowed with advantage; for independently of the importance of saving the patient unnecessary pain, these agents will help to relax the os uteri.

For chronic cases the same plan of treatment is to be resorted to. If the inversion be of some years' duration, it will probably be necessary to repeat the attempts at replacement day by day, for some seven or eight occasions; keeping up pressure in the intervals by the introduction into the vagina of a well-adapted air pessary. This practice failing, Dr. Robert Barnes's suggestion of making an incision on either side of the os uteri, and then reapplying pressure, ought to be tried. In a case of inversion of six months' standing, which resisted elastic pressure steadily maintained for five days, Dr. Barnes made three longitudinal incisions into the os uteri, so as to relax the circular fibres; the taxis when then applied succeeding quickly in effecting reduction. Assuming that, after as many fair attempts as seem justifiable, the inversion be found irreducible, is further treatment to be abandoned? As a general principle, the answer to this question must be in the negative. For there is sufficient evidence to show that the danger of the patient sinking from the constant irritation and repeated hemorrhages produced by an inverted womb is really greater than that which follows the removal of the organ by the ligature or écraseur. The experience which I have had with the latter instrument in other operations upon the uterus, leads me to recommend its employment in this; for if the chain be worked slowly and cautiously there is no fear of hemorrhage, while the risk of inflammation is certainly less than with the ligature.

X. DISEASES OF THE OVARIES.

The ovaries (the analogues of the male testes) are oval-shaped bodies, placed one on each side of the uterus, in the broad ligament, between the Fallopian tube and the round ligament. Each gland is some eighteen lines in length, twelve in breadth, and about one hundred grains in weight; each is in a great measure invested by peritoneum; while each is connected with the side of the uterus by the ligament of the ovary, and with the fimbriated extremity of the Fallopian tube (the oviduct) by a slight ligamentous cord. Along the anterior margin of the ovary, where there is no

peritoneum, the proper fibrous tunic of the ovary (the tunica albuginea) is seen; inclosed in which is the vascular stroma, having numerous transparent vesicles (Graafian follicles) imbedded in its structure. Every vesicle is an ovisac, containing an extremely minute ovule or ovum, surrounded by albuminous fluid. As each menstrual period approaches, a Graafian vesicle reaches the surface of the ovary, and then rupturing, the contents of the vesicle pass into the canal of the oviduct, the orifice of which, for the time, has become attached over that part of the ovary containing the ripe vesicle. The ovisac having discharged its contents, a little extravasation of blood and serum takes place into it; and some firm yellow material having been exuded from the walls, a corpus luteum is formed. If pregnancy happen from the union of the male sperm-cell with the female germ-cell (or ovum), then the corpus luteum is much larger and more vascular, and presents more yellow matter than where the ovule perishes without fecundation. In the one case there is a true, in the other a false corpus luteum.

The ovaries may be absent; or they are sometimes found undeveloped, retaining their fœtal condition throughout the life of the bearer; or they can become prematurely atrophied—before the usual time for the change of life. Their other morbid states will now be considered under the heads of inflammation, tumor, and displacement.

1. ACUTE AND CHRONIC OVARITIS.—Inflammation of the ovary (formerly known as Oophoritis) in the non-puerperal state, occurs under two forms,—the acute, and the subacute or chronic. The first variety is as rare as the second is common. It is comparatively seldom that both glands are simultaneously affected in either form; while the left ovary is more frequently attacked than the right. In sixty-eight cases of acute and chronic ovaritis, the histories of which have been collected by Dr. Tilt, the inflammation was on the left side in 34, on the right in 21, and on both sides in 13. Moreover, it is happily an exceptional circumstance to find the morbid action running on to suppuration.

Acute ovaritis may be due to violence, or to the application of strong caustics to the cervix, or to the suppression of the menses from a sudden shock or cold, &c. Pelvic cellulitis and peritonitis now and then originate it, the inflammation spreading to and involving these glands. Ovaritis has also occurred during the progress of gonorrhœa; but whether due to this disease, or to its treatment by astringent injections, copaiba, &c., seems doubtful.

One of the prominent symptoms is pain, which is of a variable character. Sometimes it is persistent and intense; although more frequently it is not continuously severe, but rather of a dull aching character, with a recurrence of sharp lancinating paroxysms. The lower part of the abdomen is tender, and especially so are the groin and the inner part of the thigh, on the side corresponding to the affected gland. If the morbid action continue unchecked, the tissues of the broad ligament (if not already inflamed) become involved in the mischief; and then the pain is greatly increased, while the bladder usually suffers. The calls to micturate are frequent: the urine becomes scanty, high-colored, often loaded with urates, and scalding. When also that portion of the serous membrane covering the lower part of the descending colon and rectum gets affected, there will be symptoms of tenesmus: while the passage of scybala often causes intense suffering, especially if the hardened fæces press upon the inflamed ovary. There is usually considerable constitutional disturbance,—such as fever, rapid pulse, a thickly coated tongue, distressing nausea and retching, flatulence,

disgust for food, restlessness, &c. A vaginal exploration shows that the cervix uteri is free from swelling or undue heat, although it is often somewhat tender. But on moving the finger to the right or left side, according to the ovary affected, the practitioner will detect an exquisitely sensitive body, which body is found to be almost immovable, and at least about the size of a large walnut. Where the abdominal walls are thin, the gland may be more distinctly felt by making pressure with the left hand above the pubes, while the forefinger of the right hand is retained within the vagina.

Pus may form in the ovary without there being any well-marked symptoms to indicate its presence, excepting more or less severe and constant pain. This happened with a lady who was under my care several years ago, and who died in consequence of the effusion of the matter into the peritoneum. In the larger number of instances, however, the occurrence of suppuration has been indicated by rigors, a quick and feeble pulse, a glazed red tongue, excessive sickness, and a sense of weight and throbbing about the lower part of the abdomen. The tissues in the neighborhood of the ovary and broad ligament get involved in the suppurative inflammation; so that the case becomes one of pelvic cellulitis. Should the abscess burst into the rectum, or into the vagina, a feeling of relief will usually be experienced immediately, and the patient may ultimately do well; though not unfrequently these cases are very troublesome, as the opening closes and the matter accumulates again and again. Where the pus is discharged into the peritoneum, inflammation will be set up, which is almost certain to end fatally.

During the treatment of acute ovaritis complete rest in bed is needed. I have seldom had recourse to depletion unless the attack has been connected with a sudden suppression of the menses. But in such cases the application of four or six leeches to the lips of the uterus often gives marked relief. Hot hip-baths, repeated night and morning for twenty or thirty minutes at a time, are always serviceable; their employment being followed by the introduction of a pessary of opium and belladonna (F. 423) into the vagina. When the bath produces faintness, half a tumblerful of white wine whey (F. 10) ought to be given at the time of depression. If it be thought desirable to administer mercury, this agent may be advantageously mixed with the pessary; but care should be taken not to produce salivation. As a rule, a mixture containing full doses of iodide of potassium with chlorate of potash will be found much more efficient than any of the mercurial preparations. Fomentations to the lower part of the abdomen, or hot linseed poultices applied over the vulva and hypogastric and inguinal regions, are serviceable. Where these measures fail to relieve the pain, opium should be given; sometimes one grain of the extract being needed every three or four hours. Supposing that suppuration has occurred, and that the abscess decidedly points in the vagina, it may be advisable to carefully let out the pus with a trocar or bistoury; but the practitioner had better not interfere unless he feels quite certain with regard to the diagnosis. I know of no means by which an ovarian abscess can be distinguished from a pelvic abscess; and therefore, as regards treatment, it is fortunate that such differentiation is unnecessary.

Chronic or *subacute ovaritis* is a very common affection during the period of sexual vigor. This will not appear remarkable if it be remembered how closely allied the process of ovulation is to inflammation. The monthly congestion of the ovary, terminating in a rupture of its coats, is just that kind of physiological process which would seem most likely to run on to disease upon very slight provocation. And not only does this periodical

congestion predispose to attacks of ovaritis, but it often renders the affection very obstinate when once established; for while the inflammation interferes with the healthy performance of the menstrual functions, the morbid menstruation aggravates or perpetuates the inflammation. So, also, whatever interferes with the due performance of the uterine and ovarian functions may induce subacute ovaritis. In this way it can be set up by cold, especially if this cause be called into play during menstruation. The injection of iced water into the rectum to check flooding, has been known to induce an attack of ovaritis. Again, this disorder is not infrequent in the newly married, being produced by excessive sexual intercourse; while it is not an uncommon cause of suffering to prostitutes. The improper application of caustics to the uterus, or the rough use of the uterine sound, can set up inflammation; just as the rash employment of the catheter may make false passages in the male urethra, or may induce orchitis. But as catheterism is not to be condemned because it is productive of mischief in unskilful hands, so the uterine sound can only be spoken of as "an abomination," by gentlemen who have not the dexterity to handle it with the care which all instruments require. Lastly, I believe that subacute ovaritis will at times occur spontaneously in women of a rheumatic diathesis; and also in such as have a syphilitic taint. It is very probable that ovarian syphilis may consist either of an inflammatory action diffused through the whole gland; or of hypertrophy from the production of gummata.

The chief symptoms of this form of inflammation are: a dull and continuous aching in the ovarian and sacral regions: tenderness about the upper part of one or both thighs; scanty and difficult menstruation; and pain on sexual intercourse. Irritability of the stomach is common; so that there are frequent attacks of nausea, of indigestion, and sometimes of sickness. There are paroxysms of hysteria; with soreness and irritability of the bladder. Evidence is given of more or less dysmenorrhœa and leucorrhœa; as well as of tumefaction and tenderness of one or both breasts. In exceptional cases there may be appearances leading to the suspicion of masturbation. Attacks of nymphomania, or even some chronic forms of insanity, occasionally have their origin in subacute ovaritis. If pressure be made over the groin on the affected side complaint will be made of pain, while now and then there is a slight apparent fulness; and if a vaginal examination be instituted, the inflamed gland will be felt swollen, and sensitive to the touch.

As to the selection of remedies, it must be remembered that the sufferers from subacute ovaritis are for the most part delicate women; and that no plan of treatment will be successful which does not tend to improve the general health. Hence it is always important to pay attention to all that pertains to hygiene. The patient should clothe warmly; and especially ought she to wear cotton drawers in the summer, and flannel ones during the winter months. Her diet should be nourishing, animal food being taken at least once a day; while malt liquors must decidedly be forbidden, and milk freely allowed. Gentle exercise had better be taken daily in the open air; walking generally causing less annoyance than the jolting of a carriage. Riding on horseback does harm, even if it can be borne. Warm hip-baths, once or twice a week, are also useful; whereas cold bathing is generally injurious. Sexual intercourse will at least retard the cure. With regard to drugs, I confess to having most faith in the chlorate of potash, which should be ordered in twenty-grain doses three or four times a day. Where this fails, success often follows from the use of the iodide of potassium, which is generally best given in combination with some bitter infusion (F. 31). Where there is much pain, from five to ten minims of tincture of

aconite should be added to each dose. Cod-liver oil is especially serviceable, provided the stomach can digest it; and even if there be any difficulty in this respect, a daily dose of pepsin (F. 420) will often overcome it. And then, locally, no agents will prove so serviceable as the iodide of lead and belladonna pessaries (F. 423), one being introduced into the vagina every night. When the sacral pain continues in spite of the use of these pessaries, a belladonna plaster ought to be applied. It is only necessary to add that bleeding and purging and blistering have never appeared to me to be necessary. On the other hand, I have seen all the symptoms considerably aggravated by the administration of steel.

2. OVARIAN TUMORS.—Three varieties of tumors are met with in the ovary, viz., the fibrous or solid, the cancerous, and the cystic. The first two kinds demand but little notice. For not only are they rarely met with, but the innocent growths seldom destroy life unless improperly interfered with, while the attempt to remove a malignant tumor by abdominal section will probably prove immediately fatal, and in any case can scarcely be expected to effect a thorough cure.

Cystic disease of the ovary, the common ovarian tumor, consists in the conversion of the gland, or of parts of it, into cysts. These cysts, in at least the majority of cases, have their origin in the Graafian vesicles. This seems proved by Rokitansky's demonstration of the presence of an ovule or ovum in an ovarian cyst. Dr. Woodham Webb has likewise examined a tumor, the multilocular character of which was produced by clusters of ovisacs of various sizes, while he found ova in all the small sacs. There is also every probability that Dr. C. G. Ritchie's suggestion is correct—that in some cases ovarian cysts are actually due to the development of the ovum while still in its ovisac. From some cause the ovule has not been able to escape out of its sac, and it has undergone a series of transformations while retained. Such changes occur quite independently of impregnation. Looking at the structure of the ovary, seeing that it is a cyst-forming organ, the wonder is, not that cystic development now and then proceeds to an abnormal extent, but that it does so with such comparative infrequency.

There are three varieties of ovarian cysts—the simple or unilocular; the compound, multilocular, or proliferous; and the dermoid cysts. The simple cysts are less frequently met with than the compound; they often attain a considerable size, and the fluid they contain generally resembles urine in appearance and density, while it is loaded with albumen. The multilocular tumor is the most common; the cysts vary in size, there frequently being one large one, with a number of smaller sacs congregated towards the pedicle; and the albuminous contents are thick or gelatinous, often dark-colored from admixture with altered blood, and presenting large quantities of cholesterin, which may be skimmed from the surface after the fluid has been evacuated. The dermoid cysts (or ovular growths as I would call them) are peculiar, inasmuch as they are examples of an attempted development of the ovule or ovum, without fecundation; such growths containing skin, bone, hair, teeth, and sebaceous matter.

Ovarian tumors run their course much more rapidly than is generally supposed; and it seems to me probable that the greater number prove fatal within four years from the first recognition of the symptoms.* For

* The most marked exception to this rule which I have met with is the following: On July 22d, 1861, I saw Mrs. W., of Camberwell, in consultation with Drs. Brodie Sewell and T. B. Crosby. She was 72 years old, was married at 19, had three children, and aborted exactly 40 years ago. After this abortion there was no pregnancy, but she noticed that her stomach remained enlarged. On consulting Sir Ast-

although the growth of the tumor is at the commencement slow, yet after it has attained sufficient size to prove of considerable inconvenience, the rate of increase is as rapid as the development becomes marvellously great. Like all diseases of the sexual organs, the one under consideration is most common during the time that the functions of the ovaries are called into play. The greater number of cases occur between the ages of 30 and 40, and next between 20 and 30. The disease affects both married and single women—perhaps the former more frequently than the latter; while the sufferers from it are often sterile, or at all events their pregnancies have been few.

With regard to the ovary most liable to be affected, it seems that if we look to the records of 500 cases of ovarian tumor, examined only during life, we shall find the disease said to be seated in the right gland in about 230 cases, in the left in some 190, and in both in 80. But if we take only those cases where the opinion has been verified by operation or post-mortem investigation, then the numbers become much more equal, though there is still a slight preponderance in favor of the right side. In about one case in twenty both glands are diseased, although the proportion is said to be much greater by some authorities.

The deaths registered as due to ovarian dropsy, in England, during the twenty years (1847–66) have averaged 225 annually. Throughout these years the mortality has not varied very considerably; the largest number of deaths for any one year being 277 (in 1859), while the smallest number has been 178 (in 1852).

The *symptoms* produced by an ovarian tumor in its early stages are usually so slight, that the disease ofttimes fails to attract any attention until the patient finds her abdomen rapidly enlarging; while even then, so little pain or annoyance does she experience, that the increase in size is often attributed to pregnancy, to flatulence, or to the growth of fat. It is only in exceptional instances that the tumor, while small enough to remain in the pelvic cavity, gives rise to irritation of the rectum or bladder, or to a sense of weight and oppression, or to pain and numbness extending down the thigh of the affected side; these symptoms being much more characteristic of ovaritis, and even of fibroid tumors of the uterus. Pain in the back—an annoying aching and weakness about the sacrum, is not unfrequently complained of; but women so constantly suffer from this, that they hardly think of seeking advice for it. Moreover, in the greater number of cases menstruation continues regular; though in others the flow may be

ley Cooper and Sir Charles M. Clarke she was told that there was an ovarian tumor. This tumor had therefore continued to grow very slowly for forty years: it never appeared to interfere with the uterine functions, the catamenia continuing regular until the age of 52. Since the change of life her health has been good, but the tumor has been very inconvenient owing to its size. During the past six months there has been a painful ulcer on the left ankle, which resists all attempts at cure. On examination there is found an immense ovarian tumor, consisting of one large cyst and several smaller ones. The dyspnœa is most urgent. To alleviate the latter I tapped her, and removed seven gallons of a thick dark-colored fluid loaded with cholesterin. The relief was very great, and in four days the ulcer on the ankle healed. On July 1st, 1862, she was nearly as large as before, and therefore tapping was resorted to for the second time, six gallons of fluid being taken away. She had enjoyed, however, nine or ten months of comparative ease since the first operation. By January 30th, 1863, the cyst had refilled; the tumor being of such a size that it rested upon the thighs down to the knees when she sat up. She was much prostrated, there was urgent dyspnœa, and great swelling of both legs. In the hope of giving her a respite, Drs. Sewell and Crosby agreed with me that she should be again tapped, and I drew off four and a half gallons of very thick fluid. The operation was productive of relief, but she sank from exhaustion four days afterwards.

entirely suppressed, or it will appear irregularly, or it may be scanty or profuse.

When the tumor has attained such a size that it can no longer escape observation (which, strange as it may appear, will probably not be until it is as large as a child's head) then pain or tenderness begins to be complained of; the pain not being so unbearable, however, as is the sense of distension, although the suffering becomes severe when any peritoneal inflammation sets in. The menstrual function often gets disordered or suppressed, the patient loses flesh, and the tumor by its pressure interferes with the functions of the abdominal viscera. Constipation, indigestion, diminished secretion of urine, with frequent micturition, are amongst the chief complaints; while there is loss of appetite, restlessness at night, dyspnœa, diminution of strength, and in fact a sense of progressive general decay. On examining the abdomen, it is found much enlarged; and it may be difficult at first to decide whether this enlargement be due to a tumor, or to ascites, or to a combination of both. There is fluctuation, which varies in distinctness according to the number of cysts, their distension, and their size; while percussion elicits a dull sound over the whole tumor, except with those rare instances which will presently be referred to. In not a few cases the growth gives rise to ascites; but almost always, after a time, the lower parts of the abdomen, as well as the vulva with the thighs and legs, become œdematous. Then the suffering rapidly increases, and the tumor greatly impedes the patient's movements; the nights are wretched, the sleep being imperfect and unrefreshing, while the attacks of dyspnœa prevent the woman from lying down; there is sometimes suppression of urine, followed by headache and stupor, convulsions and coma; or great prostration sets in, which soon ends in death.

The *diagnosis* of this disease is not always so easy as the physician might imagine from examining a well-marked case. In the early period, when the tumor is confined to the cavity of the pelvis, the patient seldom seeks advice; since she is either unaware of the existence of any morbid condition, or if she experience some slight inconvenience she deceives herself as to its cause. At this stage, however, if by chance an examination per vaginam be made, a tumor, varying from the size of a hen's egg to that of a large orange, will be discovered on one side or other of the uterus; while the vagina will be found elongated, and the os uteri drawn upwards and towards the affected side. At the same period inspection of the abdomen will detect the existence of a certain amount of fulness on one side of the hypogastrium, or in one of the iliac regions. As the enlargement increases, the abdominal swelling becomes more symmetrical; so that when the tumor has reached the umbilicus, it is often somewhat difficult to decide whether one side of the abdomen presents any greater prominence than the other. Many practitioners imagine that an ovarian tumor always occupies the side on which the disease is situated, while the pregnant uterus is believed to have its centre as constantly in the median line; but neither of these propositions is absolutely correct.

A small ovarian tumor is more likely to be mistaken for a fibroid tumor growing from the side of the uterus, or for a distended urinary bladder, or for an abscess in the broad ligament, or for an extra-uterine gestation, than for the pregnant uterus. But the former may often be distinguished by the feeling of great elasticity, hardly amounting to fluctuation, communicated to the touch on making a vaginal examination; by the facility with which the sound can be passed into the uterine cavity, and the manner in which the uterus can be perceptibly moved away from the tumor and independently of it; by the persistence of the tumor after emptying the bladder

with the catheter; by the non-existence of those constitutional symptoms which arise from inflammation ending in suppuration; and by the absence of those firm inequalities of surface which are produced by the different parts of the fœtus. The history of each case, and the duration of the symptoms, will also afford material help in forming the diagnosis; though I have seen recent cases of ovarian dropsy where there has existed suppression or irregularity of the catamenia, morning nausea and vomiting, indigestion, troublesome constipation, irritability of the bladder, a sense of movement in the abdomen, and swelling with tenderness of the breasts.

The chief diagnostic marks of an ovarian tumor which has attained a large size are the following: The abdomen is found more or less completely occupied by the morbid growth; the enlargement being smooth and rounded without any prominences when the disease is of the unilocular variety, but often very uneven in the multilocular form. A practitioner has been known to confidently assert that the limbs of a child could be distinctly felt through the parietes, when there was only an ovarian tumor causing a considerable inequality of surface. In the erect posture, as well as in the supine, the tumor projects forwards, the flanks being undistended. In the multilocular, more commonly than in the unilocular tumor, the superficial veins coursing over the abdomen are seen to be enlarged; and it has been thought by some observers that the vessels on the side corresponding to the diseased ovary are generally the most distended. This observation, however, I have not been able to confirm. Pressure with the hand on the tumor communicates a sensation of great resistance; this resistance being most equable in the case of the unilocular disease, though it is almost the same in the multilocular tumor when there are large cells. Fluctuation is always very distinct where there is only one cyst; being of course more imperfect and obscure where there are several, and no single one of great size. Unless the morbid growth is very large and projects into the loins, or unless ascites coexist, fluctuation will not be detected in the flanks. The more viscid the contents of the cyst, the more obscure will be the fluctuation, as a general rule; and the same remark holds good when the cyst-walls are very thick, or when the sac is very much distended. The pulsations of the aorta are sometimes communicated to the hand laid over the tumor. Percussion elicits a dull sound over the whole of the tumor, the only exceptions being when a coil of intestine passes between the tumor and abdominal wall, as it sometimes does just above the pubes; or when the cyst has been tapped, and has afterwards filled with air; or when a cyst has emptied itself into the intestine, and flatus has passed from the latter into the former. The dulness is uniform over the mass of the tumor, and its note is not affected by change in the posture of the patient; but there is resonance above the tumor, and in that lumbar region into which the intestines have been forced, which is always the one corresponding to the healthy gland. By auscultation a murmur can sometimes be heard in one or both iliac regions, owing to pressure exerted by the diseased mass upon the iliac arteries; otherwise only information of a negative kind is gained, there being an absence of borborygmi, and of course of the sounds produced by pregnancy. Cysts of moderate size, when free from adhesions, do not modify the respiratory movements; but when the growths are large they restrain the descent of the diaphragm, and especially do they do so when adherent. And then, in every case, the signs of pregnancy should be looked for; not only to prevent any gross mistake in diagnosis, but so as to avoid the more excusable error of overlooking the coexistence of utero-gestation with ovarian dropsy.

The diseases which have chiefly been mistaken for ovarian tumors are the following; Fibroid and fibro-cystic tumors of the uterus, especially when

these have attained a great size. Instances of ascites, with a much enlarged spleen; or other examples of peritoneal dropsy, where the effusion of fluid is so copious that the intestines cannot float on its surface, and consequently there is dulness on percussion. Cases of extra-uterine pregnancy, which have gone on until the death of the fœtus without rupture of the cyst. Enlargements of the kidney, either from hydronephrosis or cancer. Hydatid tumors of the liver, and of the omentum. A tumefaction produced by a mass of intestines bound together by old peritoneal adhesions. Malignant and other growths from the peritoneum. Phantom tumors of the abdomen; the result probably of abnormal muscular action, combined with flatulence, and an excessive accumulation of fat in the abdominal parietes as well as in the omentum. And lastly, extensive collections of fæces, filling the rectum and even the greater portion of the colon, have led to an incorrect suspicion of ovarian disease.

Hitherto reference has been chiefly made to the diagnosis of simple ovarian disease from other affections causing abdominal enlargement. Every now and then, however, we meet with complicated cases,—that is to say, in combination with an ovarian tumor there is an enlarged spleen, or hydatid disease of the liver or omentum, or a renal tumor, or chronic inflammation of the peritoneum with a considerable effusion of ascitic fluid, &c. When, together with an ovarian tumor, there is enlargement of the uterus from disease, the diagnosis is difficult. In one very puzzling case which was under my care there were three separate affections; viz., ascites, a multilocular ovarian tumor the size of an adult head, and a uterus enlarged by two intramural fibroid tumors which had passed upwards out of the pelvis. The abdomen was immensely distended; but whether this distension was chiefly due to an ovarian tumor with one large cyst and a good deal of solid matter, or to ascites complicating some pelvic tumor, could not be determined until after tapping. An examination per vaginam showed the presence of some large uterine tumor; for there was a solid body evidently attached to the womb and appearing to cause retroversion, the os uteri being drawn high up under the pubic arch. In truth, however, the state of things could only be guessed at; the exact condition not being learned until after death.

As regards the *treatment* of ovarian tumors nothing can be more absurd and reprehensible than the practice which some gentlemen even now adopt of administering hydragogue cathartics, diuretics, emetics, mercurials, iodine, iodide of potassium, liquor potassæ, bromide of potassium, muriate of lime, &c. Equally injurious are the local applications which the same practitioners employ, such as leeches, blisters, iodine ointment, friction with stimulating liniments, electricity, &c. It is only necessary to examine a single ovarian tumor, to see that such agents cannot by any possibility do good; and, consequently, as they are of a very powerful nature, they must be productive of harm. That such is really the case, I know too well; and I am led to speak thus plainly, from the painful examples which have come under my notice, of health entirely ruined, and death hastened, by violent medical treatment.

There are only four ways in which the physician can hope to give effectual relief, or to accomplish a cure in ovarian dropsy. The first plan is by abdominal tapping; the emptying of the cyst or cysts being followed by the application of firm and well-adapted pressure, with the administration of large doses of chlorate of potash for several months, or of this salt in combination with iodide of potassium. As examples of tapping presenting one or several points of more than usual interest, I append short histories of some of the cases in which I have adopted this practice:

CASES OF TAPPING FOR OVARIAN TUMOR.

No. and Date of First Consultation.	Age, Social Condition, and History.	Dates of tapping, Fluid removed, &c.	Result.
1. January 28, 1848.	40. Married eighteen years. One child and one abortion. Catamenia regular. Abdomen began to enlarge six years ago: now is greatly increased in size.	*February* 19, 1848: nearly fourteen pints of very albuminous fluid removed. Abdomen was padded and tightly bandaged. The fluid was not resecreted: no tumor felt.	When last seen on *July* 15, 1852, had remained quite well.
2. August 3, 1851.	30. Single. Supposed to have her stomach enlarged from pregnancy. Catamenia regular. Stomach been swollen for some months, especially on left side.	*August* 20, 1851: twelve pints of albuminous fluid removed. Operation rendered necessary by dyspnœa. No return of dropsy.	*November* 3: sent to the Carshalton Infirmary. Remained well *June* 16, 1852.
3. November 27, 1851.	52. Married. One child many years ago. Catamenia ceased about six years ago. Abdomen been getting large for seven years. Is much emaciated; has severe attacks of dyspnœa.	*December* 19, 1851: twenty-seven pints and a half of dark-colored albuminous fluid removed. The empty unilocular cyst distinctly felt: it was unadherent, and sprang from right ovary. Tightly bandaged. Recovered rapidly.	*March* 30, 1855, says she has not had an hour's illness since the tapping. *April* 30, 1861: tumor as large as her head. No inconvenience.
4. December 10, 1851.	45. Married twenty-five years. Two children, the last being twenty-one years old. The catamenia were regular until twenty months ago, when they ceased. Abdomen been rapidly getting large for eighteen months. Is now very large: weak and emaciated.	*December* 16, 1852: thirty-five pints of thick, dark-colored, albuminous fluid removed. Multilocular ovarian tumor could be felt adherent to every part of abdominal parietes. *February* 14, 1853: again tapped, twenty-one pints of fluid removed.	*March* 6, 1853: died from exhaustion.
5. June 7, 1855.	43. Married. Three children: never aborted. Catamenia been absent since *August*, 1853. Abdominal tumor first detected in *October*, 1852. Now there is a large multilocular tumor, from right ovary, universally adherent. Six months ago was tapped at the Islington Dispensary, and a pailful of fluid removed.	*June* 11, 1855: tapped the largest cyst, and removed nearly twenty-seven pints of almost black and thick fluid. *June* 21: appears as large as before. Is very weak: abdomen very tender, as if there were a low form of subacute peritonitis. Derived great relief from opium.	*June* 29: died from exhaustion. At the autopsy the diagnosis was confirmed: the firmness of the adhesions would have prevented removal. The largest cyst was full of dark-brown fluid.

Cases of Tapping for Ovarian Tumor—(Continued).

No. and Date of First Consultation.	Age, Social Condition, and History.	Dates of Tapping, Fluid Removed, &c.	Result.
6. July 11, 1855.	42. Married. Four children; sixteen years since birth of the last. Catamenia been absent one year. "A ball" first felt at lower part of abdomen two years and a half ago. Abdomen now filled with a large multilocular ovarian tumor: probably from left ovary. General health very bad. On *October* 26, 1853, was tapped at Charing Cross Hospital: in *January*, 1855, at the Middlesex Hospital.	*July* 15, 1855: tapped and removed a large pailful of fluid. *November* 11: tapped, with same result. *December* 28: appeared to be in great danger from dyspnœa: was tapped. Withdrew a pailful and a half of fluid. *Feb.* 7, 1856 / *March* 14, " / *April* 24, " / *June* 5, " / *July* 17, " / *Aug.* 29, " / *Oct.* 11, " / *Nov.* 22, " / *Dec.* 22, " } Was tapped on each of these days with same result as on *Dec.* 23, 1855. { *Feb.* 10, '57 / *March* 25, " / *April* 17, " / *May* 16, " / *July* 3, " / *July* 18, " / *Sept.* 15, " / *Oct.* 28, " / *Nov.* 28, " At the last tapping an elastic catheter was left with one end in the cyst; but as irritation was set up, it was withdrawn. The wound did not heal; a purulent fluid coming away daily.	*December* 27, 1858: died from exhaustion.
7. March 20, 1856.	29. Married. Never pregnant. Catamenia regular. Abdominal tumor detected one year since. Now is the size of a woman at seventh month of pregnancy. The case is favorable for ovariotomy; but it was determined to give the chance of cure by paracentesis.	*March* 31, 1856: tapped, and took away half a pailful of urinous-looking fluid, which was loaded with albumen. Was tightly bandaged. In June she was quite well: was then going for a sea voyage.	*December* 10, 1856; remains quite well. Stomach the natural size.
8. July 15, 1861.	57. Married. Twelve pregnancies: ten children, the last having been born in 1850. Change of life occurred at forty-nine. Has a very large multilocular ovarian tumor, which was discovered eighteen months ago; it is universally adherent. Is weak and emaciated: has distressing dyspnœa. One brother died of enlarged spleen with dropsy; another, of phthisis; and a sister now has disease of the heart and liver.	*July* 16, tapped and withdrew twenty-five pints of fluid. There is a great deal of solid matter about the tumor. *September* 8: found her dying; with very urgent dyspnœa. To relieve the latter, a pailful of fluid was removed by tapping.	*September* 5, 1861: death. At the autopsy made by Dr. Popham, the adhesions were so strong that the tumor could not be got out.

Cases of Tapping for Ovarian Tumor—(Continued).

No. and Date of First Consultation.	Age, Social Condition, and History.	Dates of Tapping, Fluid Removed, &c.	Result.
9. July 22, 1861.	72. Married. Four pregnancies: last was forty years ago. Ovarian tumor discovered at that time (see note p. 829). Now is enormously distended: appears to be dying from dyspnœa. For six months has had a painful ulcer on left ankle.	*July* 22: tapped and withdrew fifty-six pints of brown soupy fluid, loaded with cholesterin and albumen. *July* 1, 1862: drew off forty-eight pints of fluid. *January* 30, 1863: drew off thirty-six pints of fluid.	*February* 3, 1863: death from exhaustion.
10. November 12, 1861.	20. Married. First and only child born after a difficult labor on *October* 10. Abdomen never subsided to natural size. On *March* 6, 1862, an ovarian tumor as large as an adult's head was detected. Has become very stout; and therefore suffers more distress than usual from a tumor of such a size. Complains also of great pain all over the abdomen.	*May* 7, 1862; tapped and withdrew fifteen pints of fluid. Ordered iodide of potassium, which was taken with great advantage for many months. *May* 5, 1864: after an easy labor, I delivered her of a healthy boy. *June* 4, 1864: owing to rapid growth of tumor since her labor, it was necessary to tap her again, removing eighteen pints of fluid. *April* 4, 1865: removed eighteen pints of fluid by tapping. *November* 4, 1865: withdrew nearly twenty pints of fluid, and introduced twelve inches of drainage-tubing. This was left in until *December* 3. The discharge subsequently became purulent, and continued to escape through the hole left by the tube. Tumor scarcely distinguishable. *June* 14, 1866: says she is well. Is going to Margate.	*August* 30, 1866: returned very ill from Margate last night, and died this morning. She appeared to have an attack of pneumonia; and travelling with this it proved fatal.
11. May 9, 1862.	57. Single. Thinks her stomach began to enlarge when she was forty-three: there is no real evidence of its having done so. Only since a severe attack of pain in *April*, 1861, has there been any decided abdominal tumor. Now she is enormously distended with a multilocular tumor, firmly adherent to abdominal parietes. Health much depressed.	*May* 14, 1862: removed forty pints of a thick chocolate-kind of fluid, loaded with cholesterin. *July* 25: health much improved by the tapping. Abdomen greatly enlarged still: the cyst which was emptied is slowly refilling. *July* 29, 1863: tapped for the second time, and withdrew twenty-eight pints of fluid. Solid matter of tumor increased during past year. Health very bad: is very feeble.	*August* 30, 1863: death from exhaustion. At the autopsy, made by Dr. G. P. Rugg, each ovary was seen to be converted into a large multilocular tumor. Both growths were adherent; the adhesions with right tumor were universal and strong.

Cases of Tapping for Ovarian Tumor—(Continued).

ıd Date of 'onsultation.	Age, Social Condition, and History.	Dates of Tapping, Fluid Removed, &c.	Result.
12. ıuary, 1863.	40. Married two years. Catamenia regular but abundant. Never pregnant. Has an abdominal tumor the size of a cocoanut: cannot say whether it is ovarian or uterine. Did not see this patient again until *April* 1, 1866. Abdomen enormously distended by a large and almost solid ovarian tumor, an enlarged spleen, and a quantity of ascitic fluid. Can scarcely get about: urgent attacks of dyspnœa.	*April* 15, 1866: removed twenty pints of ascitic fluid. Ovarian tumor universally adherent. Spleen almost as large as a healthy liver. Refused to subject her to ovariotomy. The tumor may be uterine (fibro-cystic), but the balance of evidence is in favor of the ovarian origin. *November* 28, 1867: removed a few pints of ascitic fluid. Both tumor and spleen are larger, *February* 3, 1868: tapped in two places, but could only get away four pints of fluid. Suffers most severe pain.	*April* 26, 1868: died this morning, worn out with pain, dyspnœa, and prostration. Opiates and all kinds of sedatives could only be taken for a short time.
13. ember 18, 1862.	62. Widow. Seven pregnancies, of which five ended in abortion: the last was eighteen years ago. Change of life occurred at fifty-one. Had an attack of uterine hemorrhage last May. Has an ovarian tumor as large as a cocoanut. Mother died at seventy-three; father, at ninety-five. No hereditary tendency to tuberculosis or cancer. Aspect rather suspicious of malignant disease.	*May* 3, 1863: tapped and removed some pints of fluid. *June* 25: repeated the tapping, taking away a pailful of fluid. *August* 29: tapped with same result as before. Did so again on *November* 21: had to do so in two places, first to get away nearly a pailful of ascitic fluid, and then to empty the largest ovarian cyst.	*December* 2, 1863; death from exhaustion. At the autopsy, made by Mr. James Wilson, two large ovarian tumors were found adherent to each other. There were masses of medullary cancer on the peritoneum, and many pints of ascitic fluid.
14. ember 23, 1864.	34. Single, Catamenia usually regular; they were absent for six months three years ago: six weeks since last appearance. The belly has been enlarging four years: there is now a large tumor in the abdomen. Difficult to say its nature. Medical men have differed as to its being hepatic, or ovarian, or cancer of omentum, or pregnancy, or renal (from right gland). As there was more mental than bodily distress, palliatives were ordered.	*June* 21, 1865: the tumor has gradually increased, but only recently has it seriously interfered with respiration, &c. Is very weak, and much emaciated. Tapped three cysts separately: from one there was removed a pint of clear gelatinous fluid; from the other two six pints of a chocolate-colored liquid came away.	*August* 25, 1865: death from exhaustion. The tumor was found to spring from right ovary, and to extend upwards, overlapping the liver. The growth was made up of small cysts and solid matter—a colloid tumor.

Cases of Tapping for Ovarian Tumor—(Continued).

No. and Date of First Consultation.	Age, Social Condition, and History.	Dates of Tapping, Fluid Removed, &c.	Result.
15. December 27, 1864.	33. Married. Six children: the last was born in *April*, 1862. Since this labor has had pain in left ovarian region, extending round the back and down the left leg. Sometimes has to keep her bed for fourteen days, as this pain takes away all power from affected leg: is always worse at catamenial periods, which are regular. *February* 26, 1865: for first time a careful examination was permitted. Found a tumor of left ovary as large as a newborn infant's head. It gives the impression of being formed of one cyst with solid matter about the pedicle.	*November* 12, 1865: tumor is larger than it was. Remedies (including iodide of potassium, chlorate of potash, quinine, &c.) fail to relieve the occasional attacks of pain. I therefore tapped it to-day, and removed 7 pints of a thick chocolate-colored fluid. Bandaged tightly: put her upon full doses of chlorate of potash. *June* 20, 1868: remains well. Has been taking chlorate of potash for more than two and a half years. On careful examination, a tumor can be felt in the cavity of the pelvis as large as a cricket ball. To leave off medicine.	*January* 23, 1869: continues to feel quite well. Tumor just as it was last June.
16. July 27, 1866.	55. Married. Twelve pregnancies, including three abortions. Last pregnancy and natural labor twelve years ago. Catamenia ceased at age of fifty. Has had an abdominal tumor for two months. The belly is now as large as at full term of gestation. The nature of the enlargement is doubtful; but there is either ascites or a large unilocular ovarian cyst, with other mischief. Is very thin, weak, and anæmic.	*August* 8: removed a large pailful of amber-colored fluid by tapping. The case is one of an enlarged spleen, with a large unilocular ovarian tumor everywhere adherent. *September* 6: tapped again with same result as before. *September* 14: was deluged this morning with a discharge of water from the uterus. Her attendants say that "several quarts" came away. *November* 5: tapped and removed a pailful of fluid. Left a piece of india-rubber tubing in the cyst and wound. *November* 7: removed the tubing, as it was causing irritation and depression. Subsequently, care was taken to build her up, and she took large doses of steel and cod-liver oil. The fluid has never been resecreted.	*January* 22, 1869: says she is quite well. Can walk three or four miles. An examination shows that the splenic enlargement remains. A rather confused substance can also be felt, which is probably the collapsed ovarian cyst.
17. May 25, 1867.	54. Widow. Five children: thirteen years since last: never aborted. Stomach began to enlarge in *October*, 1865. Now has an ovarian tumor: there is one large cyst, with solid matter about the pedicle.	*May* 27: removed twelve pints of a thick albuminous fluid. Bandaged. Ordered to take full doses of chlorate of potash for many months. Left in the hands of Mr. Bannister.	*March* 6, 1868: reported to be quite well. On examining her a fortnight later, however, I found the tumor to be quite perceptible, and I believe enlarging.

The second plan is by paracentesis and the retention of an elastic catheter (or a drainage-tube) in the wound, to withdraw the fluid as it is resecreted. This proceeding, however, is by no means free from danger. It is seldom had recourse to, unless the tumor be firmly fixed. Where it is movable, however, it should be made to adhere to the abdominal wall before evacuating the contents of the cyst and introducing the tube. With this object, the ingenious plan suggested by M. Trousseau had better be adopted, in preference to the use of caustic. This gentleman used to select the site most convenient for the ultimate introduction of a trocar, covering the skin in this region with a patch of diachylon plaster, about the size of a crown piece. Through this he plunged from twenty to thirty steel needles (each about four inches long, and tempered in the flame of a candle) which passed into the tumor, and were prevented from sinking through the skin by a head of glass or sealing-wax that rested upon the plaster. These needles caused scarcely any pain in their introduction, and they were allowed to remain in situ for five days. During this time, some local tenderness usually developed itself, which was strictly limited to the area in which the needles had been introduced. At the expiration of the five days the needles were removed; and a small drop of the fluid of the cyst following the withdrawal of each, showed that adhesion had taken place. This fact might also be ascertained by palpation. After this proceeding, M. Trousseau could always plunge a trocar into the cyst without fear of any accident.

The third plan consists in tapping the cyst, removing its fluid contents, and then injecting into it a solution of iodine. With regard to this, I can only say, that in the cases in which I have tried it, no permanent good has resulted; while in the hands of some physicians it has caused death. The only instances in which it is available are the unilocular tumors, or just those that may be often cured by tapping and pressure. Moreover, there is a fear of the disease being ascites, and not a simple ovarian cyst; and then the injection would probably prove fatal. If, however, this plan be resorted to, the cyst must be emptied; and then a mixture, made of forty grains of iodine, sixty grains of iodide of potassium, and two ounces of water, is to be injected and left in the cyst, care being taken that none of it escape into the peritoneal cavity. Tapping per vaginam has been advocated by some authorities; but as it has not appeared to me to possess any advantages over the ordinary mode to counterbalance the increased risk of wounding important structures, I have not practiced it. Sometimes a cure is effected by rupture of the cyst, with extrusion of its contents into the intestine or vagina, or into the sac of the peritoneum, whence they are removed by absorption. I have never seen a case where the fluid has been discharged through the Fallopian tube; and I believe that, in all probability, the examples which have been recorded of such an occurrence have been instances of dropsy of this canal owing to inflammation combined with obliteration of its orifices.

The fourth and last plan is by abdominal section, and the removal of the entire growth through the wound. Appended are notes of all the cases in which I have had recourse to this dangerous expedient,—to opening the abdomen, with the object of extracting an ovarian tumor.

Cases of Abdominal Section for Ovarian Tumor.

No., Date, and Place of Operation.	Age, Social Condition, and History.	Nature of Operation: Treatment of Adhesions, Pedicle, &c.	Result.
1. April 22, 1852. Bedford Street, Red Lion Square, London.	56. Single. Charwoman. Catamenia ceased eleven years ago. Thinks her stomach has been slowly enlarging since. Now has no pain but suffers from dyspnœa. Cannot do her work. Has a multilocular ovarian (right) tumor.	March 1, 1852: tapped her and removed nearly two pailfuls of fluid. Tumor having partly refilled, ovariotomy was performed April 22. Chloroform administered by Mr. Hulme. No adhesions. Pedicle ligatured with twine: ligature retained outside the wound, after dropping the pedicle into pelvis.	July 14, was quite well and strong. March 16, 1857, remains quite well. March 5, 1858, died to-day from general dropsy.
2. March 15, 1853. Hampstead Road, London.	46. Married twenty-four years. Never pregnant. Catamenia always irregular. Abdomen began to enlarge fourteen months ago. Is weak and emaciated. Is as large as a woman at full term of pregnancy.	October 25, 1852: tapped her and removed eight pints of fluid. This reaccumulated. March 15, performed ovariotomy. Chloroform administered by Dr. H. J. Sanderson. Adhesions broken down with finger. Pedicle ligatured and dropped into pelvis: ligatures kept outside the wound. Tumor multilocular, from left ovary: probably malignant.	March 21, died from exhaustion Vomiting very troublesome from time of operation until death.
3. April 29, 1853. Soho Square, London.	27. Married one year. Never pregnant. Catamenia regular until a few weeks ago. Enlargement of abdomen commenced in August, 1852. Now has a large multilocular ovarian tumor.	On making a short exploratory incision, firm and extensive adhesions were found. Attempts at removal of tumor not carried further: largest cyst was tapped, eighteen pints of fluid being removed. Chloroform was given by Dr. H. J. Sanderson.	Recovered from operation. Disease proved fatal November 6, 1853.
4. May 26, 1853. Chancery Lane, London.	31. Married. Tumor has existed five months: thought she was pregnant.	Tumor removed by short incision: slight adhesions. Ligatures retained outside wound, after dropping in the pedicle. Chloroform administered by Dr. James Rice.	Cured. Remained well for two years. Then had symptoms of phthisis: result unknown, but probably unfavorable.
5. October 1, 1853. Mildenhall, Suffolk.	32. Married: mother of seven children, the last nearly two years old. Tumor very large: been growing fourteen months: been tapped twice by Mr. Harris. She is anxious to have the chance of recovery afforded by an operation, though her case is very unfavorable.	Exploratory incision of seven inches. Tumor could not be removed owing to extent and firmness of adhesions. Chloroform was given. Operation followed by great prostration and sickness, which continued in spite of Mr. Harris's careful treatment.	Died from exhaustion at end of twenty-four hours.

Cases of Abdominal Section for Ovarian Tumor—(Continued).

No., Date, and Place of Operation.	Age, Social Condition, and History.	Nature of Operation: Treatment of Adhesions, Pedicle, &c.	Result.
6. May 14, 1855. Soho Square, London.	38. Married eighteen years. Has had eleven pregnancies: the last eighteen months ago.	Tumor could not be removed owing to firm adhesions. Chloroform was administered by Dr. McLimont.	Recovered from operation. Ultimate result unknown.
7. May 2, 1857. London.	42. Married: never pregnant. Has had an enlarged abdomen for about three years. There is a large multilocular tumor.	Short exploratory incision. Tumor could not be removed owing to adhesions.	Recovered. Died from the disease December 27, 1857.
8. December 19, 1857. Lamb's Conduit Street, London.	41. Married. Never pregnant. Catamenia always irregular. Tumor been growing four years.	Tumor removed by short incision. Pedicle dropped in, after ligaturing. Ligature slipped Chloroform administered by Dr. Armitage.	Death at time of operation from hemorrhage.
9. March 14, 1860. Endell Street, Bloomsbury, London.	31. Single. Had a child when she was eighteen, but asserts that it was the result of a single intercourse. Catamenia regular. Abdomen began to enlarge at the end of last year. Now is much distended. The diagnosis is difficult between ascites with a small fibroid tumor of the uterus, and a large ovarian cyst; by a vaginal examination, solid matter can be felt.	A small incision, two inches long, made into abdomen midway between umbilicus and pubes. Cyst emptied of thirty-three pints of gelatinous fluid and then gradually drawn through the wound; smaller cysts near pedicle, also tapped. Pedicle long and thin: tied with a single ligature, which was retained outside the wound. Chloroform given. Had no bad symptoms. Ligature came away at end of second week. Mr. Weekes assisted in the after-treatment.	Cured. Was perfectly well in November, 1859, when she sailed for Australia.
10. November 24, 1860. Bishopsgate Street, London.	30. Married ten years. Has had five children and one abortion: last child two years old. Catamenia irregular. Abdomen been enlarging twenty months. Multilocular ovarian tumor from right side, with ascites.	Five pints of ascitic fluid Tumor adherent to omentum: vessels in latter had to be tied. Pedicle ligatured: stump of pedicle retained outside wound Had chloroform. After-treatment chiefly managed by Dr. Robert Fowler.	Cured. In good health March 8, 1861. Died about March, 1868, of what was called "chronic rheumatism of the left leg."
11. September 28, 1861. Maiden Lane, Covent Garden, London.	41. Single. Catamenia ceased three years ago Tumor first detected in February.	Exploratory incision. Pelvic adhesions prevented removal. Chloroform was given by Mr. E. U. Berry. In January, 1862, tumor opened into bowel: it continued thus to empty itself until death.	Recovered from operation. Disease proved fatal March 7, 1862.

Cases of Abdominal Section for Ovarian Tumor—(Continued).

No., Date, and Place of Operation	Age, Social Condition, and History.	Nature of Operation: Treatment of Adhesions, Pedicle, &c.	Result.
12. January 2, 1862. Kennington.	27. Widow. One child nine years ago: four abortions, the last two years back. Tumor discovered after this abortion. Now has a large multilocular ovarian cystic growth from right side.	Incision six inches long: adhesions to omentum. Pedicle retained externally by clamp. Chloroform was used by Mr. Hulme. After-treatment conducted by Mr. Weekes.	Cured by January 31, 1862.
13. December 20, 1862. Newmarket.	20. Single. Catamenia regular. Was first seen on May 31. There was then a tumor as large as a cocoanut: it had been discovered five months previously. Stomach gradually became much distended. There has been great distress from pain and dyspnœa, with a low state of health.	Nearly a pailful of ascitic fluid came away on opening the peritoneum. To extract the tumor, which was solid and from right gland, the incision had to be extended to nine inches. Remains of pedicle kept outside by a clamp. Chloroform was given. Tumor weighed nine pounds. The after-treatment was managed by Dr. Day (now of London).	Death from peritonitis on December 22, 1862.
14. August 18, 1863. Henrietta Street, Cavendish Square, London.	21. Single. Catamenia regular. Tumor discovered in May, 1861. Now has a large ovarian tumor, probably unilocular, springing from left ovary. Mother died from ovarian dropsy.	No adhesions. One large cyst, with small ones about pedicle. Latter kept outside the wound by a clamp. Dr. Anstie administered chloroform. After-treatment partly conducted by Dr Meadows. Was able to return home September 15, though the wound was not quite healed at site of pedicle.	Was quite well on December 9, 1863.
15. July 16, 1864. Chapel Place, Cavendish Square, London.	29. Married. Applied for advice early in May, as her stomach was very large: catamenia had then been absent for five months. An examination showed that she was pregnant, and that there was also an abdominal tumor. At the beginning of June she miscarried: child was dead, its body being covered with a dark-brown eruption. A fortnight after delivery this patient's abdomen was larger than before labor. A multilocular cystic growth from left ovary was diagnosed.	Chloroform was given by Mr. Hulme. An incision four inches long was made, and a cyst tapped. There were only slight adhesions to peritoneum in front. Small cysts near the pedicle had to be emptied before the whole mass could be withdrawn. The pedicle was ligatured in two parts, and divided; and then the ligatures were cut off short, and the pedicle allowed to fall into pelvis.	Cured by September 4. An attack of peritonitis at first excited alarm; but the inflammation was subdued by mercurial inunction and opium. This complication seemed to be connected with a syphilitic taint.

Cases of Abdominal Section for Ovarian Tumor—(Continued).

No., Date and Place of Operation.	Age, Social Condition, and History.	Nature of Operation: Treatment of Adhesions, Pedicle, &c.	Result.
16. May 14, 1865. Broad Street, Bloomsbury, London.	40. Widow. Two children: the last twelve years old. Catamenia regular: ceased four days ago. Tumor multilocular, from left ovary: very large. First discovered eighteen months back.	Length of incision eight inches. Slight adhesions. Pedicle ligatured, and then dropped into pelvis: ligatures kept out of wound. Chloroform was administered by Mr. Coates. One ligature came away on June 10: as there was irritation, the other was drawn out as far as possible and then cut off.	Cured. Remained well at end of year, when she married. Subsequently became pregnant.
17. September 5, 1867. Chapel Place, Cavendish Square, London.	47. Single. Catamenia been irregular for some time: 6 months since last appearance. 13 years ago stomach began to enlarge. Now (August 26. 1867), the abdomen is enormously distended. Legs much swollen: cannot lie down. There is an immense multilocular tumor springing from the right ovary. Is 50 inches in circumference just beneath umbilicus, which is turned out, forming a swelling as large as an orange: from ensiform cartilage to pubes the measurement is over 30 inches. Feels that she cannot live unless something is done to relieve her. She fully understands the desperate nature of both the disease and the remedy.	A very long incision was required: the adhesions, though firm, were broken down with the finger, except where the tumor was adherent to the omentum. The pedicle was so short that it could scarcely be reached; so that four ligatures were applied through and around the lower part of the solid matter. This part was kept external to the wound. Anæsthesia produced by Dr Grasseman with a mixture of chloroform and ether. The loss of blood was small.	Death from shock within twenty-four hours.
18. October 24, 1867, Old Cavendish Street, London.	50. Married. Three pregnancies, the last twelve years ago. Catamenia ceased in 1864. From May, 1865, was under my care with disease of mitral valve and albuminuria. In February, 1867, had an attack of uterine hemorrhage. Bleeding returned in March, and continued for some few weeks. On examination a small tumor could be felt. When next seen on August 29, the abdomen was found filled with ascitic fluid and a large ovarian tumor. Urgent dyspnœa and general distress.	August 29, 1867, eighteen pints of ascitic fluid removed by tapping. September 18, twenty pints of fluid removed, relief being absolutely needed. Oct. 24, the fluid was as abundant as ever. An exploratory incision was therefore made into the abdomen, when it was found that the tumor was so firmly wedged in the pelvis by its lower portion, that it could not be moved. Chloroform administered by Mr. Clover. On October 31, she felt so well that she would sit up (against orders). Part of the wound was suddenly rent open by the strain of a cough: a quantity of ascitic fluid escaped. This seemed to set up a low form of peritonitis, with great prostration.	Death on November 2, 1867. At the autopsy, ovarian tumor was found wedged into the pelvis by two uterine fibroids.

Cases of Abdominal Section for Ovarian Tumor—(Continued).

No., Date, and Place of Operation.	Age, Social Condition, and History.	Nature of Operation: Treatment of Adhesions, Pedicle, &c.	Result.
19. December 3, 1867. Chapel Place, London.	54. Single. Catamenia only ceased one year ago: for two years previously had floodings, which were cured by the removal of a polypus 20 months ago. Her stomach was large then, but the parietes were loaded with fat. A multilocular tumor, from right ovary, was only positively diagnosed six months ago. This now fills the abdomen. General health bad.	Long incision: firm adhesions to abdominal wall. Tumor turned out of pelvic cavity with difficulty, owing to amount of solid matter wedging it in. Pedicle ligatured in two parts; ligatures cut short, and all dropped in. Chloroform was given by Mr. Hulme. Had no unfavorable symptom.	Cured by December 30. Has gained flesh and strength by June, 1868.
20. February 25, 1868. John Street, Fitzroy Square, London.	19. Single. Catamenia began at fourteen: always regular, rather copious. Was first seen on October 19, 1867, when an ovarian tumor was diagnosed. In spite of full doses of chlorate of potash, the abdomen steadily enlarged. On February 11, 1868, the catamenial period began: after being rather free, as usual, it ceased at the end of seven days. It was decided to allow another week to elapse before operating.	On opening the abdomen it was seen that there were two tumors. The left, the largest, was emptied, and drawn out; its pedicle pierced and ligatured in two parts; and the tumor being removed and ligatures cut short, the stump was dropped into pelvis. The right tumor was treated in the same way. Both growths were unilocular and unadherent to surrounding parts. Insensibility was induced by Dr. Meadows with a mixture of chloroform and ether. Drs. Peplow and Seabrooke assisted in the after-treatment. The fact of both ovaries being diseased without influencing menstruation, is remarkable. The tumors are preserved in the museum of the Obstetrical Society of London.	Death from pyæmia on March 4. No cause for fatal result discoverable at the autopsy by Dr. Seabrooke.
21. August 12, 1868. Welbeck Street, London.	25. Single. Catamenia come on every three weeks, and continue ten days. Was not aware of the presence of a tumor until her first consultation with me July 22, 1868. The growth of this tumor was remarkably rapid, while a large quantity of ascitic fluid became developed in one week.	Tumor was multilocular, and from right ovary: the pedicle was divided by the cautery. The ascitic fluid more than filled an ordinary pail. Chloroform was administered by Mr. Clover.	Death from pyæmia on August 17.

An analysis of the foregoing table gives the following results:

Cases of completed ovariotomy followed by recovery, . . .	9
" " " " death, . . .	6
Cases of attempted ovariotomy (adhesions), no mischief ensuing, .	4
" " " " death resulting, . .	2
Total, ...	21

In the completed fatal cases the causes of death were: exhaustion (2), hemorrhage (1), peritonitis (1), and pyæmia (2). Of the cases where the operation had to be abandoned in consequence of the firmness of the adhesions, one died from exhaustion; while the cause of death in the second was a low form of peritonitis, chiefly brought on by the patient's sitting up seven days after the operation, when a straining cough caused the wound to open. Finally, with regard to those cases where the operation was abandoned and the patient recovered from its effects, three died from the ovarian disease at about the end of six months; while the result in the fourth case is unknown.

Before describing the operation of ovariotomy it may be mentioned, that my guiding rule in all cases of ovarian cystic disease is this: When the tumor is not increasing in size, is not affecting the patient's health, and is unproductive of any unpleasant symptoms beyond those resulting from its weight, I do nothing at all, merely directing the patient to see me in the event of any change. These cases are unfortunately very rare. Supposing that the tumor is small but gradually growing larger, there can be no objection to trying to retard such growth by administering chlorate of potash. This salt never does any harm, and I cannot help thinking that I have seen small tumors remain stationary in consequence of its free exhibition. As a matter of fact, however, much more than simple palliative treatment is needed in the majority of cases. We have really to decide between paracentesis and ovariotomy; in doing which regard must be had to the patient's health, constitution, age, the condition and nature of the tumor, the presence or absence of firm adhesions, &c. Where there is any hope of cure from paracentesis, it is of course to be resorted to in preference to attempting the removal of the tumor; but in certain cases, and especially in the multilocular tumors, ovariotomy is the only proceeding which offers a reasonable chance of rescuing the patient from an early and very painful death. Taking into consideration all the examples of this operation which have been published, it appears that success has followed in about two cases out of three; while with greater care in the selection of cases than has yet been generally exercised the results will probably be more favorable.

The mode of performing *ovariotomy* remains to be described. And first, with regard to the preparation of the patient it is only necessary to say that she should be in her usual health, that the bowels ought to be properly relieved every day for some time before the operation, and that solid food must be avoided on the day that the tumor is to be removed. If the operation can be performed about a week after the catamenial period, so much the better. Secondly, the temperature of the apartment is to be raised to about 70° Fahr., while it is advisable to render the air moist with steam. A good nurse should be present, who is to take charge of the patient afterwards. The duties of the assistants are to be arranged beforehand, while no one is to approach the patient who has been in the post-mortem room for two or three days previously, or who has been in attendance upon any case of erysipelas or puerperal peritonitis or scarlet fever, &c. The opera-

tor will take care to have ready on a handy tray such instruments as scalpels, strong scissors, a broad director, two large trocars with elastic tubing connected with the canulæ, strong vulsellum forceps, artery forceps, a couple of clamps, one or two cauteries, needles with and without handles, silver wire for sutures, and strong hemp ligatures. A supply of new fine sponges, flannels, lint, adhesive straps, towels, ice, basins of warm water, and one or two pails, will also be required. An excellent operating-table may be made by covering an ordinary dressing-table with three or four blankets, and putting some firm pillows at the head. The bed which the patient is afterwards to occupy ought to be in the same apartment. Thirdly, the patient, lying upon her back, with the head elevated, and the dress so arranged that the abdomen can be thoroughly exposed, is to be put under the influence of chloroform or ether. The operator having passed the catheter so as to be certain that the bladder is empty, then makes an exploratory incision in the linea alba; commencing about two inches below the umbilicus, and carrying it downwards for three or four inches. Easy as it may appear to cut down through the peritoneum, the most experienced operators are sometimes puzzled to know when they have reached this membrane; inasmuch as this serous sac bulges forward and often looks very much like a portion of the bowel, or it resembles the wall of the cyst. The peritoneum can, however, always be distinguished from intestine by making one or two taps on the finger laid over it; the percussion-note being dull, unless there be a portion of bowel present. To discriminate between the peritoneum and the cyst is more difficult, and needs a sharp eye with a delicate touch; many cases being known where gentlemen have proceeded to separate this structure from the superimposed transversalis fascia, under the belief that they were merely breaking down adhesions between the tumor and the lining membrane of the abdomen. However, the peritoneum having been divided, and the ascitic fluid which is usually present having been allowed to escape, the hand (dipped into warm water) is to be introduced so as to learn whether any adhesions are present. If any be found they should be cautiously broken down. When the cyst is freed it begins to bulge through the wound, and the trocar is then to be introduced at the most prominent part, taking care that none of the fluid escapes into the abdominal cavity. As the sac gets emptied, its walls are to be grasped with a pair of strong vulsellum forceps, and traction exerted so as to withdraw the whole tumor. While an assistant keeps the intestines within the abdomen by pressure with one or more fine new flannels wrung out of warm water, the operator takes care that the tumor is nowhere adherent to the omentum, and examines the pedicle. Finding that all is clear, he applies the clamp (nothing answers better than the common carpenter's calipers) as tightly as possible round the latter, and as near the tumor as possible, and then cuts off the greater bulk of the tumor. For by leaving a small portion about the size of half an orange, to be removed at the end of twenty-four hours, all fear of slipping and secondary hemorrhage will be prevented. The other ovary having been examined and found healthy, the wound is to be quickly closed by silver wire sutures. These had better be introduced about an inch apart, by means of a needle with a handle; and I believe it is better to pass the sutures through the entire abdominal wall, just including the edges of the peritoneum. The portion of tumor left outside, with the clamp, is then wrapped in lint; three or four long strips of strapping are applied completely round the body, so as to cross over the wound; and a suppository of two grains of opium is introduced into the rectum, or—and it answers better—half a grain of morphia is injected under the skin. The patient is then lifted into bed; and if the administration of the anæsthetic has been

well managed, consciousness will not return until she has been comfortably arranged.

There are one or two significant points in the foregoing operation which had better be mentioned before speaking of the after-treatment. The most important is as regards the management of the pedicle. Now, although the clamp has been just recommended, yet I am sure it will often be advantageous to dispense with this instrument: for it cannot be denied that keeping the pedicle outside the abdomen retards the healing of the wound, while months afterwards the traction exerted may be the cause of very annoying dragging pains. To obviate these inconveniences, the pedicle has been secured with strong hemp ligatures; and these having been cut off short, the stump has been returned into the abdomen. Dr. Tyler Smith has had great success with this plan, and I have seen it answer admirably in the hands of Sir William Fergusson, as well as in some of my own cases. Dr. Marion Sims transfixes the pedicle with a double silver wire, and dividing it twists each wire tightly round half the pedicle. The ends of the wire are then cut close off, the tumor is separated from the pedicle, and the latter with its ligatures dropped into the pelvis. The metallic ligature becomes entirely imbedded in the structure of the pedicle, the tissue cut by it overlapping the wire and healing over it, so that even strangulation does not occur as with a silk or hemp ligature. It is an excellent practice; though I doubt if it be as generally applicable as the division of the pedicle by the actual cautery. With this instrument Mr. Baker Brown has had a succession of favorable cases, and it is decidedly a valuable proceeding, especially where the pedicle is thick and short and fleshy. For long and thin pedicles the ligature, cutting it off short and letting the whole fall into the pelvis, is more suitable. In one instance (case 21 in the table) where I had recourse to this cautery, it answered perfectly; for although the case ended unfavorably, yet death only occurred five days after the operation, and could in no way be attributed to the manner in which the pedicle had been treated. When adopting this practice, the pedicle is compressed with a clamp invented by Mr. Clay, of Birmingham, and the tumor is then removed by dividing the pedicle with the cautery at just below a white heat. There has been much unnecessary discussion with regard to the length of the wound. The best plan is to make the incision as already recommended; and then enlarge it, rather than try by force to bring a large mass of semisolid matter through a small opening. Where the tumor is of the unilocular kind, or where there are only two or three cysts which can be each emptied by the trocar, a short incision of course suffices. Then with respect to adhesions, care will be necessary lest when they have been broken down they give rise to hemorrhage. To prevent this, their site should be examined before closing the wound, so that if blood be escaping the bleeding points may be lightly touched with the cautery. If the omentum be wounded, one or more ligatures had better be applied and the ends cut off short, instead of bringing them out at the wound. And lastly, I would advise the surgeon to dispense with all kinds of bandage after the operation. Having very seldom used one, I can certainly affirm that such an appliance is unnecessary; while it is no little advantage to have the arrangements such, that the wound can be inspected without disturbing the patient.

The more simple the after-treatment, the better. If there be thirst, or troublesome sickness, ice ought to be freely sucked. Then, for nourishment during the first twenty-four hours, iced milk, and the yolk of a new-laid egg beaten up in water, with a teaspoonful or two of brandy will suffice. If there be no sickness, and if all be going on well, white fish with a glass

of sherry and water may be allowed on the second day; while on the following, a mutton chop should be given. When there is much vomiting, however, we must trust to enemata of milk, beef tea, &c. In those cases where I have employed the clamp, the part of the pedicle and tumor above this instrument has been cut off close at the end of twenty-four hours, and then two days subsequently the clamp itself has been taken away. The wire sutures through the edges of the abdominal incision have seldom been withdrawn before the fifth, and often not before the eighth or ninth day; long slips of strapping being then employed until the wound has healed. It need scarcely be added that the air of the patient's room must be kept most pure, that the temperature should be about 60°, and that the strictest quiet ought to be maintained. If any symptoms of general peritonitis set in, linseed poultices, hot fomentations, and opium are the remedies to trust to. Caution will be necessary with regard to stimulants, avoiding both extremes; that is to say, while not commencing them too soon, care must be taken not to defer their administration until it is too late.

Several years since I proposed, that in those cases where the abdominal section was made, and it was found impossible to remove the tumor owing to the presence of extensive adhesions, the pedicle should be tightly tied after the withdrawal of the fluid contents of the cysts by tapping. Thus it was hoped that whilst the supply of blood furnished to the growth by its adhesions might be sufficient to prevent gangrene, the obstruction of the main arterial channels would prevent the fluid from being secreted anew. In truth, however, this suggestion is of little value. For in almost all cases where adhesions exist they will be found in the pelvic cavity, and consequently the application of a ligature around the pedicle is as difficult to accomplish as the removal of the tumor itself. Still it may be as well to call attention to the suggestion, so that if by chance an instance should occur where the pedicle is found free from the surrounding structures, other circumstances preventing the removal of the cyst, such a pedicle might either be ligatured or secured by acupressure.

3. DISPLACEMENTS OF THE OVARY.—The displacements to which the ovary is liable are of two kinds,—those where one or both glands are forced out of position by some uterine or other tumor, and those where the ovary escapes from the pelvis as a hernia.

The displacements of the first class chiefly aggravate the symptoms of the disease causing them. In addition, however, they will frequently be the cause of considerable suffering. Thus, a small fibroid tumor of the uterus may be accompanied with severe dysmenorrhœa, with attacks of nausea, and with pain; these troubles ceasing as the tumor enlarges and passes upwards out of the pelvic cavity, so as to allow the ovary to occupy its normal position. Under the head of prolapsus of the ovary, Dr. Rigby has described a condition in which this gland has descended between the rectum and uterus—into the recto-vaginal pouch. Complaint is made of a sense of forcing and throbbing at the lower part of the abdomen, of backache, pain in the groin of the affected side, indigestion, sickness, difficulty in passing the fæces, &c.; these symptoms coming on in paroxysms. There is also dysmenorrhœa, with the passage of clots and portions of membrane. If a vaginal examination be made, the ovary will be found swollen, exquisitely sensitive, and occupying the recto-vaginal pouch; the pain produced by the examination, like that caused by the passage of a solid motion, continuing for hours afterwards. The treatment should consist in the exhibition of mild aperients, so as to clear out the intestinal canal and prevent further accumulation of fæces; in the use of the iodide of lead and bella-

donna pessaries (F. 423), so as to reduce the ovarian swelling and tenderness; and in rest on the sofa, with the avoidance of sexual intercourse. Under such management, the ovary will sometimes be restored to its natural position; or we may be able to gently raise it with the finger, and, perhaps, to keep it up by the introduction of an elastic pessary.

In the second set of cases, the ovary has escaped out of the pelvis, constituting a true hernia of the gland. This condition is sometimes congenital, but it may also happen accidentally after puberty; while it can take place on one side of the body only, or on both sides. The ovary has escaped from the cavity of the pelvis, either at the inguinal ring, or at the crural arch, or through the tissues of the vagina, or at the sciatic notch like an intestinal ischiatic rupture. From the anatomical relations of the pelvic viscera it can be readily understood that hernia of the ovary occurs more frequently at the inguinal ring than at any other site; the passage of the round ligaments through the internal abdominal ring, and along the inguinal canal to the labia majora, leaving a weak point. The hernial sac may contain the ovary alone; or with this gland there will possibly be a portion of intestine, the Fallopian tube, and even the uterus.

The history of a peculiar case, in which the left ovary was found in the sac of an oblique inguinal hernia, was related at the Royal Medico-Chirurgical Society by Mr. Holmes Coote. The patient, a young woman, was admitted into St. Bartholomew's Hospital with a swelling in the left groin, and suffering from the symptoms of strangulated hernia. In the course of a few hours the usual operation was performed, when the ovary and the Fallopian tube were found in the sac. A similar malposition of parts was subsequently noticed on the opposite side of the body. The left ovary was removed, some thickened omentum carefully cut away, and the patient put to bed; but the sickness and constipation continued, and she died four days after the operation. The cause of the sickness, &c., was displacement of the stomach and transverse arch of the colon. The most remarkable feature in the case, however, was that the woman said she had always menstruated regularly. Now, on the examination of the body, it was found that both ovaries were *well developed*, and that the formation of the Graafian vesicles was going on naturally; but the Fallopian tubes were quite impervious, the uterus was completely absent, and the vagina was a short canal—an inch and a half in length terminating in a thin membrane. She said that she had been menstruating in the customary manner the week before her admission; and some of the female attendants at the hospital noticed the usual marks, though faint, upon her dress. If this were so, the menstrual discharge could only have taken place from the mucous lining of the imperfect vagina.

An example of hernia of the right ovary, in which this gland was successfully removed, has been reported by Dr. Meadows.* In this case the patient was twenty-three years of age, single, and from birth had had a swelling in the right inguinal region. At fifteen she began to menstruate; but it was only five years afterwards that the swelling commenced being painful, when another one appeared just below it. At the next monthly period this second tumor became the seat of considerable suffering, and it increased much in size. From this time the pain was violent at each period, while the tumor would swell up to the size of two fists and be exquisitely tender to the touch. Dr. Meadows having decided that this

* Transactions of the Obstetrical Society of London, vol. iii, p. 438. London, 1862.

tumor was ovarian (the upper being probably an omental hernia), got Mr. Lawson to excise it; when it was found to consist of the right ovary, measuring two inches in length and one in diameter, and in a state of cystic degeneration. The operation proved eminently successful.*

Speaking generally, surgical treatment is seldom to be practiced in these cases. When the hernia is recent, attempts ought to be made to reduce it; and then, if success should follow these efforts, a well-fitting truss should be worn to prevent any recurrence of the ovarian descent.

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* For other examples of ovarian hernia see the author's Signs and Diseases of Pregnancy, second edition, p. 450. London, 1867.

PART XIII.

DISEASES OF THE SKIN.

THE early writers on skin diseases separated the study of these affections from general pathology, and thereby committed no small amount of mischief. For medical men having thus been led to regard dermatology as a specialty—to look upon skin eruptions as simply disorders of either the epidermis (cuticle) or of the derma (cutis), took but little pains to acquire any accurate knowledge of them; so that from inexperience they were led to believe that cutaneous affections were multitudinous in their nature, very confused in their respective appearances, particularly rebellious to treatment, and governed by pathological laws at variance with those controlling other structural diseases. It is only during the last few years that more enlightened opinions have prevailed: that practitioners have begun to see how these disorders are chiefly brought about by the relationship between the blood and the investment of the surface of the body being disturbed, such disturbance being originated sometimes by an alteration in the composition of the blood, sometimes by modified blood-distribution owing to morbid changes in the nervous centres or in the nerve-trunks, and sometimes by disordered changes in the cells of the skin-tissues secondarily affecting the blood and nerves.

Although the division of cutaneous affections into Orders or Classes assists very materially to simplify their diagnosis and management, yet the student must not expect to find these disorders always existing in one simple form. On the contrary, we quite as frequently see two or three in combination as not; the coexistence of lichen and eczema, or of impetigo and eczema, or of urticaria and lichen, being just as common as simple eczema, impetigo, lichen, &c. So again, one source of irritation may produce a different eruption in different individuals. Thus, the effect upon the skin of wearing clothing dyed with the brilliant coal-tar colors will be the production of troublesome excoriations in some individuals and of stubborn nettle-rash in others; while socks colored with these poisons may give rise (as Mr. Webber has clearly shown) to obstinate irritation only, or to protracted pain and lameness—not to mention the symptoms of general poisoning. Again, the ingestion of some particular kind of food will set up urticaria in one person and erythema or herpes in another; while the Acarus scabiei can give rise to a vesicular, pustular, or papular rash, according to some peculiarity existing in the supporter of this parasite.

The classification which it is proposed to adopt in these pages is that of Willan, considerably modified. There are certainly much more ambitious and extensive arrangements to be found in our various systematic treatises; but their value can be judged of from the fact that most special

writers on these affections ignore the classification adopted by their predecessors and contemporaries, although at the same time they confess that the day for suggesting a perfect synopsis has not yet arrived. While hoping therefore that our knowledge may become sufficiently precise to enable us to draw a distinct line between the essentially local and essentially constitutional skin diseases, to determine the exact causes of both kinds, as well as to show in what part of the cutaneous structure the different disorders have their seat, while waiting and hoping for this good season it seems useless to adopt a confessedly imperfect plan because it is novel. Willan's classification has at least the merit of having lived for more than sixty years, of being based on the *visible* characters of the disease, and of being simple and intelligible. The different orders are as follows:

ORDER 1. *Exanthemata.*—Erythema; roseola; urticaria.
ORDER 2. *Vesiculæ.*—Sudamina; herpes; eczema.
ORDER 3. *Bullæ.*—Pemphigus; rupia.
ORDER 4. *Pustulæ.*—Ecthyma; impetigo.
ORDER 5. *Papulæ.*—Strophulus; lichen; prurigo.
ORDER 6. *Squamæ*—Psoriasis (including lepra); pityriasis; ichthyosis.
ORDER 7. *Tubercula.*—Elephantiasis Arabum; molluscum; acne; framboesia; keloid; vitiligo.
ORDER 8. *Parasitici.*—Tinea tonsurans; tinea favosa; tinea decalvans; tinea sycosis; tinea versicolor. Scabies.

The order "Maculæ" [*Macula* = a stain or blemish] has been omitted. This has been done partly because it is often a matter of little moment whether portions of the skin are marked by the presence of too much or too little pigment; and also for the reason that where the discoloration is thought to be a symptom of an important constitutional affection (as in Morbus Addisoni), it is better to describe such disease in its proper place rather than give undue prominence to only one of its symptoms, especially as that one is often the least important. It may of course be said that the greater number of skin diseases, properly so called, are secondary affections; but then it should be recollected that in these, the visible sign of the constitutional derangement is of greater significance than the derangement itself. On the opposite principle jaundice, purpura, typhus, and enteric fever, might be regarded as cutaneous diseases. Whether therefore there is an excess of pigment (as in freckles, moles, pregnancy, and Addison's disease), or a deficiency (as in leucoderma and albinism), is a matter of little consequence. The actual discoloration which results cannot be remedied.

Skin diseases will be materially modified according as the patient is strumous, anæmic, plethoric, gouty, rheumatic, or dyspeptic; as well as by the age and sex, the mode of life, and the residence of the sufferer; and by the condition of the uterine functions in women. These affections may also be considerably altered by, or entirely dependent on, a syphilitic taint.

I know of no skin disease which the practitioner need be afraid of curing. The public has become imbued with the idea that suddenly "to drive in" an eruption is a proceeding often followed by very grave symptoms—by apoplexy, hemorrhage from the bowels, internal inflammations, &c. My own experience gives no countenance whatever to this opinion. On the contrary, the usual regret is that I am unable to cure cutaneous diseases as quickly as may be wished. Like other disorders, a skin eruption is mischievous: it sets up considerable irritation, while it is often a proof of a vitiated state of the vascular or of the nervous system.

In attempting to cure diseases of the skin we have to resort to constitutional and local remedies; the former being, as a rule, by far the most important. Speaking generally, our object in employing *constitutional* treatment is twofold. Thus, we endeavor to *eliminate* from the system the morbid matter upon which the eruption depends; and this can best be done by the proper use of purgatives, diuretics, and often of diaphoretics. Then we have to try and *alter* the constitutional state which led to the formation of the poison, and so restore the healthy tone of the body; a proceeding which will usually be most readily effected by the careful use of such medicines as the mineral acids, the alkalies with vegetable bitters, iodine, arsenic, phosphorus, quinine, steel, cod-liver oil, colchicum, tar, creasote, bichloride of mercury, bark, &c. The *local* remedies (amongst which are included hot air, vapor, hot and cold water, and medicated baths) are of considerable value in assisting the radical cure of the disease, as well as in moderating irritation and pain; while in the class of Parasitic disorders they can often be alone trusted to for giving permanent relief.

The diet may always be nourishing and sufficient in quantity to satisfy the patient's demands. Cocoa or chocolate, milk, sherry and soda-water, or claret; white fish, mutton, beef, chicken, and game; together with fresh vegetables, bread and butter, and light suet puddings—these are all unobjectionable articles of diet. On the contrary, it will be advisable to forbid tea and coffee, but especially the latter; as well as beer, raw spirits, sugar, pastry, most salt meats, and indigestible fruits. There must be the most strict attention to cleanliness. The patient ought to wash with warm soft water, using a thick downy towel; resorting to oatmeal, or starch, or arrowroot, or glycerin in the place of soap when the eruption is at all irritable. If any soap be used, however, the transparent glycerin soap found at most chemists is preferable to other kinds. To clean the scalp nothing is more efficacious than the yolk of an egg and warm water; though in the parasitic affections soap (especially the officinal soft soap or the carbolic acid soap) may always be freely employed. It is also better that flannel should not be worn next to that part of the skin which is affected, chamois leather proving an excellent substitute where, owing to general delicacy, it is necessary that the body be warmly clothed. And then, the physician in giving directions as to treatment must recollect that a caution will be necessary with regard to those eruptions which are contagious. When the skin of a nursing woman begins to present any eruption indicative of a cachectic state of constitution—*e. g.*, ecthyma, rupia, pemphigus, &c.—she ought at at once to wean her infant; while no female with elephantiasis, lupus, or any one of the syphilitic cutaneous disorders, should be allowed to suckle her child for a single day.

ORDER I. EXANTHEMATA.

The exanthemata [*Ἐξάνθημα*, from *ἐξανθέω* = to blossom or break out in an eruption] consist of variously formed superficial reddish patches, varying in intensity and in size, disappearing under pressure, and terminating in resolution or desquamation. There are neither vesicles nor pustules, neither papules nor scales. The small bloodvessels are overloaded with blood. The exanthemata are frequently complicated with gastro-intestinal irritation or inflammation, and sometimes with cerebral or pulmonary diseases. This order includes erythema, roseola, and urticaria. By many

dermatologists, erysipelas, measles, and scarlatina are regarded as exanthematous diseases; but such an arrangement seems to have only the questionable advantage of making the class as comprehensive as possible.

1. **ERYTHEMA.**—Erythema [from *'Ερυθαίνω* = to redden or cause blushing], inflammatory blush, or efflorescence cutanée, is a non-contagious affection; characterized by slight superficial red patches, which are irregularly circumscribed, of variable form and extent, and which subside on pressure. The patches are most frequently seen on the face, chest, and extremities. The duration of erythema often varies from a week to a fortnight. It is preceded, though rarely accompanied, by febrile symptoms; it causes but slight heat and no pain, and the prognosis is always favorable.

Several varieties of this disorder are usually enumerated. Thus, there is *erythema fugax*, so named from its fleeting nature; in which transient patches of redness appear about the face and neck, accompanied by heat and tingling. This form is generally due to some derangement of the stomach, or other part of the alimentary canal. *Erythema intertrigo* is commonly produced by friction between folds of the skin, where the secretions are not removed by washing. The parts about the neck, groins, lower part of abdomen, &c., are apt to become thus affected in obese women and children. Occasionally this rash is superseded by slight and superficial ulceration. *Erythema pernio* is the technical name for the peculiar inflammation of the skin which constitutes an unbroken chilblain. *Erythema circinatum* is very seldom met with. There are usually round red circles, or segments of circles, with well-defined rims outside. The ring-shaped patches are slightly raised: each lasts for rather less than a week, and is perhaps succeeded by a fresh patch. It comes on during the progress of rheumatic fever, especially in young women. Then there is *erythema lævе*, which is developed on the lower extremities when they become anasarcous, owing to renal or cardiac dropsy, &c. The skin is red and hot and glistening: the limb looks like brawn. The obstructed circulation through the limb leads to more and more exudation: and this, if unrelieved, gives rise to the formation of blisters that burst and discharge quantities of serum, and often to deep ulcers, which may end in mortification, when severe. But the most curious species of this disorder is that known as *erythema nodosum*; in which the eruption is confined to the fore part of the leg, taking the form of one or more large oval patches running parallel to the tibia, and rising into painful protuberances, much resembling nodes. Erythema nodosum occurs commonly in children, youths, and young women, badly nourished or overworked. *Erythema tuberculatum* and *erythema papulatum* are merely modifications of erythema nodosum; the patches consisting either of tubercles or papules, which are scattered over the face and neck, upon the arms and legs, &c.

After certain injuries and surgical operations, a rash now and then appears over the body, resembling that seen in scarlet fever. It has been already noticed (p. 247) that I believe this eruption is of an erythematous nature. Some authorities regard it as a kind of roseola.

The *treatment* is very simple, if the cause can be removed. A few doses of some mild saline aperient, such as the effervescing citrate of magnesia, or the compound rhubarb powder, do good at the onset. Then warm water or vapor baths; light diet; and tonics (especially quinine, or the compound tincture of bark, or the mineral acids) are sufficient for the cure of most forms of this affection. Any derangements of the digestive, urinary, or uterine functions which may be present, must be remedied. For some varieties a local application will be required, and then the dilute solution

of subacetate of lead can be used. In erythema nodosum the officinal ointment of veratria may be employed, if there be much tenderness; while quinine is being simultaneously administered to effect a cure. The annoyance of erythema intertrigo will be greatly relieved by washing the part every few hours with the lead lotion, thoroughly drying it, and then dusting it over with the oxide of zinc. The carbonate of zinc also forms a good dusting powder; as does the native carbonate of zinc (calamine), which is adulterated with sulphate of baryta and oxide of iron. Warm gloves or stockings, friction with a stimulating liniment, animal food, and the administration of cod-liver oil, will remove unbroken chilblains. And lastly, in erythema lævе the limbs ought to be raised so as to favor the return of blood from them; while the skin should be punctured here and there with a lancet or a needle, in order that the collected serum may drain away.

Many years ago an epidemic of erythema prevailed in Paris to which the name of *Acrodynia* was given. The eruption, however, was but an unimportant feature in a severe constitutional disorder; regarded by Chomel and others as originating in the consumption of diseased grain. Certainly the symptoms (vomiting, diarrhœa, facial œdema, muscular pains, fever, boils, uræmia, &c.) seemed to point to some such cause. The mortality was large.

2. ROSEOLA.—Roseola [Dim. *Rosa* = a rose], rose-rash, or false measles, consists of a non-contagious and diffused and inflammatory mottling of the skin, which runs its course without producing more than very slight constitutional disturbance. The rash is characterized either by transient patches of redness, of small size and irregular form, distributed over more or less of the surface of the body; or by the formation of numerous, small, slightly raised, rose-colored spots. The eruption, at first brightly red, gradually subsides into a deep roseate hue, and slowly disappears. It is accompanied by slight fever, and sometimes there is redness about the fauces. The rash fades after a duration varying from three to seven days.

Sometimes this eruption simulates measles, or more frequently it resembles simple scarlet fever. Coryza is never present, however, nor is the rash of a crescentic form, as in measles; though there is often soreness and redness of the fauces, with gastric disturbances, as in scarlatina. Belladonna now and then produces rose-rash. So does derangement of the stomach. In infancy, dentition will at times cause it. The eruption of small-pox is at times preceded by *roseola variolosa*. About the fifth day after vaccination, when the vesicle has formed, an eruption of *roseola vaccinia* now and then spreads over the body; this state being attended with febrile disturbance. An epidemic of roseola (described under the names of rosalia, rubeola notha, anomalous exanthem, &c.) which prevailed in London during 1863–64, was in all probability caused by some peculiar atmospheric condition.

There is one form of this affection which frequently affects adults, especially females, in the summer. This is called *roseola æstiva*. Women of an irritable system, with irregularity of the uterine functions, are mostly attacked. The disorder is preceded by chills and smart fever; while, when the eruption appears, the fauces often become affected. The rash and general symptoms disappear on the fifth day.

But little *treatment* is usually necessary for the cure of these rosy eruptions. Mild alteratives or laxatives, a plain diet with lemonade, a few doses of one of the mineral acids with any bitter infusion, may in some cases

be required. Where the eruption occurs in children during dentition, the gums ought to be lanced if they are tender and swollen.

3. URTICARIA.—Urticaria [from *Urtica*=a nettle], or nettle-rash, may be described as a non-contagious exanthematous eruption. It is characterized by the formation of prominent patches or wheals (technically known as pomphi), which are either red or white, of regular or irregular shape, and of uncertain duration. They are probably produced by contraction of the smooth or unstriped muscular fibres of the derma, with a slight exudation of serum. These wheals, whether few or numerous, large or small, bandlike or round or irregular in outline, &c., are accompanied (especially at night) by intense heat, a very annoying burning and tingling, and great itching.

There are two varieties: one in which the disease is *acute*, running a short, rapid course; another in which it is *chronic*, very obstinate, and either persistent or intermittent. Both forms attack individuals of all ages and constitutions. The acute variety commences with febrile symptoms—frequent pulse, dry skin, white tongue, headache, pyrexia, and epigastric tenderness; all which, however, rapidly diminish as the eruption comes out. This may happen almost suddenly, and cover various parts of the body; or the wheals may appear in one district and fade, and then again in another, and so on. The chronic intermittent variety is the *urticaria evanida* of Willan. There is no marked constitutional disturbance. The rash is very irritating: it sometimes lasts for months or even years. Acute and chronic nettle-rash assume different appearances. Hence, under one or other of these forms are included urticaria febrilis, u. evanida, u. perstans, u. conferta, u. subcutanea, and u. tuberculata.

Urticaria is often caused by certain derangements of the digestive organs. These derangements arise from the use of particular articles of diet, such as shell-fish of different kinds, cucumbers, mushrooms, cheese, nuts, bitter almonds; or from the employment of peculiar medicines, as nux vomica, henbane, turpentine, and balsam of copaiba, &c. Urticaria is also seen occasionally in connection with uterine irritation; or mental anxiety, sudden emotion, overfatigue, rheumatism, dentition, &c., may induce it. In one lady under my care attacks of asthma and urticaria seem at times to replace each other. The bites of gnats and bugs and fleas, as well as the irritation of pediculi, will now and then induce rebellious nettle-rash. A more transient form is caused by contact with the jelly-fish (Medusa pelagica), with the common nettle (Urtica urens), &c. Patients are occasionally met with whose cutaneous nerves are so susceptible that slight pressure with the finger, or any attempt at scratching, will produce a patch of urticaria.

The *treatment* of acute urticaria must consist in the administration of emetics and saline purgatives, where the disease depends upon stomach derangement. In the chronic form, a simple diet (without wine, beer, spirits, or tea and coffee) ought to be rigidly adhered to; while laxatives, antacids (especially bismuth, F. 65), and tepid or cold baths, are the chief remedies. The Turkish bath is serviceable at times. Such preparations of steel as can be readily assimilated (F. 394, 401, 403) will often effect a cure. In obstinate cases, where there are no symptoms of gastro-intestinal irritation, small doses of arsenic (F. 52, 399) may be required. If the patient be gouty, colchicum (with or without alkalies, F. 46) should be tried. Quinine is serviceable where the attacks recur with any approach to periodicity. Cod-liver oil cures some cases. Aconite has been recommended. The irritation can be relieved by the common lead lotion, or by sponging

with equal parts of vinegar and water, or by a solution of corrosive sublimate (F. 271, 276) frequently applied. Flannel underclothing always aggravates the itching and heat; the abnormally sensitive skin requires to be soothed, as well as to be kept scrupulously clean.

ORDER II. VESICULÆ.

A vesicle is a slight elevation of the epidermis, containing a serous fluid, generally transparent, but occasionally opaque or sero-purulent. The fluid may become absorbed; or it will be effused upon the surface, causing excoriation and small thin incrustations. Some vesicles are umbilicated, *i. e.*, they have a central depression: some are acuminated: most are globular. Vesicular eruptions are occasionally preceded by fever, but often break out imperceptibly. They give rise to a peculiar appearance, as if drops of water had been scattered over the surface of the skin; they may appear upon any part of the body; and they are not unfrequently more troublesome to cure than would be anticipated from their apparently slight nature. In this order we find three affections,—sudamina, herpes, and eczema. Varicella, vaccinia, and scabies are often also included; but the first two may be much more appropriately placed among the eruptive fevers, while the third is a parasitic disease.

1. **SUDAMINA.**—During the progress, and especially towards the favorable termination, of many acute and chronic diseases attended with sweating, crops of small transparent vesicles make their appearance. Thus, in acute rheumatism, typhus, scarlatina, enteric fever, &c., sudamina [*Sudo* = to sweat] are frequently found upon the trunk and extremities; especially in the latter stages of these affections. Owing to their minuteness and transparency these vesicles are apt to be overlooked, but they can usually be felt like firm little beads under the cuticle. The skin around their bases is not inflamed. They are most frequently developed upon the front of the abdomen and chest; they are sparse and scattered, or numerous and grouped in patches; frequently as one group dries up after a duration of twenty-four hours, a fresh eruption takes place; and, as a rule, they remain clear and transparent throughout their whole progress, their acid watery contents never becoming purulent.

Some authors speak of *Miliaria* [*Milium* = millet] as a distinct fever, arising from constitutional causes, and differing from sudamina produced by copious sweating. Such a view is in all probability erroneous. The distinction between the two is slight. The vesicles in miliaria are the result of sweating, but possibly of a sweat which is more acrid and irritating than that which causes sudamina. Thus, in a mild variety of rheumatic fever we may find sudamina, while in a severe form there will be miliaria. Miliary vesicles are rather opaque, somewhat irregular in form, and often present a slight red margin at their bases; while their acid (now and then alkaline) contents are more or less turbid. These vesicles often produce irritation; which is best relieved by sponging with warm water containing a little soda. Miliary eruptions are said to have occasionally been epidemic, and then they have been thought to be attended with considerable danger.

2. HERPES.—Herpes [from *Ἕρπω* = to creep], or tetter, is a transient non-contagious affection, consisting of clusters of vesicles upon inflamed patches of irregular size and form. In some respects, however, herpes resembles the exanthemata, while in others it is like a neurosis.

The eruption runs a definite course, rarely continuing for more than two or three weeks; while it is not usually severe, leaves scarcely perceptible scars (except in shingles), and is not usually accompanied by any constitutional symptoms. Care must be taken not to mistake its nature; since *herpes preputialis* has been actively treated for syphilis, and *herpes circinatus* —when occurring on the scalp—for tinea tonsurans, or ringworm. In a common cold, a cluster of herpes will usually be found upon one of the lips (p. 426), constituting *herpes labialis*. A singular and sometimes obstinate species of this disease is named *herpes zoster*, or *zona*, or *shingles*; the inflamed patches with their clustered vesicles being arranged in the form of a band, encircling half the circumference of the body. In the greater number of cases the zone will be found to occupy the right side of the body. This variety has frequently a duration varying from fourteen to twenty-one days; it occurs only once (as a rule) to the same individual, it leaves small scars, and it causes severe pains of a neuralgic character. These stinging hot pains follow the course of one or several of the cutaneous nerves, stopping at the median line. There are feverish symptoms, headache, lumbar pains, constipation, and attacks of chilliness; while although the vesicles usually dry into little scabs, yet at times they ulcerate somewhat extensively. Herpes zoster is popularly regarded with great fear; and village nurses assert that death is certain if the patches extend round the body. There is, however, no danger, unless the patient be particularly old and feeble.

In *herpes zoster frontalis*, or *herpes ophthalmicus*, or *brow shingles*, the small vesicles appear on the side of the nose, on the upper eyelid, and on the forehead. One district may be alone affected, or all three regions. Often the disease is limited to the distribution of the right or left supra-orbital nerve; which nerve may be the seat of neuralgia for some days before the rash appears. The eruption is always confined to one side; it is often the cause of much pain; and is very apt to leave little pits, or even large irregular scars, which are permanent. During its progress the various tissues of the eye now and then become inflamed, the morbid action possibly giving rise to considerable mischief. The disease is most liable to be mistaken for erysipelas; from which, however, it can be distinguished by the comparative mildness of the constitutional symptoms, and by the lateral arrangement of the rash. The pain is not only very severe at the time, but it lasts for some days after the vesicles have disappeared. The latter generally happens within fourteen days from their commencement. The remedies consist of quinine, and the use of lead lotion.*

Very little is necessary in the way of *treatment* beyond attention to the bowels and regulation of the diet. The local irritation may be relieved by the application of zinc ointment, or the officinal ointment of subacetate of lead, or the dilute solution of the same salt; or by dusting the part with powdered starch. Herpes zoster is sometimes followed by a neuralgia of the affected part which is difficult to relieve. In these instances, friction with the aconite liniment may perhaps remove the pain; but if it be severe or obstinate, a mixture of quinine and arsenic (F. 52) will usually prove curative.

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* For a good account of this disease the reader should refer to a paper by Mr. Jonathan Hutchinson in the Royal London Ophthalmic Hospital Reports, vol. v, p. 191. London, 1866.

3. ECZEMA.—Eczema [from *Ἐκζέω* = to break forth in pustules], humid tetter, or running scall, is a very common non-contagious disease, consisting usually of an eruption of small vesicles on various parts of the skin, closely crowded together, and often running into each other so as to form, on being ruptured, superficial moist excoriations. The heat and inflammation and serous infiltration of the affected part, the irritation and tingling produced by the scabs or crusts, as well as the pain of the fiery red or raw surface which results, all tend to produce considerable fever and restlessness. The serous secretion may be thin and clear, or thick and yellow and glutinous. Eczema is more often a chronic than an acute disorder.

A few years ago Mr. Milton taught that true eczema is never a vesicular disease at any period of its existence. Shortly afterwards Dr. McCall Anderson attempted to prove that the elementary lesion in eczema is not necessarily a vesicle: it may be a pustule, a papule, a fissure, or a patch of erythema. Moreover, cases are seen presenting all these lesions in combination. Similar views are held by Mr. Erasmus Wilson; but Dr. Hillier, Dr. Squire, and Dr. Tilbury Fox still maintain that the disease is a vesicular one. The latter gentleman, writing in 1869,* says that typical eczema is an acute inflammatory disease; in which, with more or less superficial redness, there is an eruption of closely packed vesicles. These run together, burst, and are replaced by excoriations which pour out serum. This dries into thin yellow crusts, which are composed of blastema, pus-corpuscles, epithelial cells, and granular matter. The vesicles may appear in successive crops, prolonging the disease indefinitely. Excoriations and crackings occur, the true skin may get infiltrated, and the parts around the patches will perhaps inflame. When the disease is extensive there may be sharp pyrexia, together with headache, loss of appetite, dirty tongue, &c. If the eruption becomes chronic, the skin gets harsh and dry and thickened; there is frequent oscillation between cure and relapse.

Now seeing that eczema is the commonest of all skin diseases, the fact that several gentlemen who have enjoyed more than ordinary opportunities for the study of cutaneous affections should differ in opinion as regards its elementary lesion is rather remarkable. But the explanation is probably this—that the patient very seldom comes under observation during the early stage. This accords with my own experience; and therefore I am unwilling to attach too much importance to the fact that I have never seen an eruption of vesicles in this disease. Still, the balance of evidence is in favor of there being such a rash occasionally.

There are several species of this disease. In all forms there is serous infiltration of the affected part of the skin, and this leads to exudation on the surface, the production of crusts or scabs, and the setting up of heat and itching, which are aggravated by stimulants and warmth. When the eruption consists of minute vesicles on different parts of the skin, with infiltration and reddened scaly patches, it is called *eczema simplex;* when the skin is inflamed, the redness persistent, and the heat and swelling and general pyrexia well marked, the disease is known as *eczema rubrum*. *Eczema impetiginodes* is a severe degree of eczema rubrum; the constitutional disturbance is great. Where the disorder arises, as it sometimes does, from great heat, especially from the heat of the sun, it is called *eczema solare;* when as a result of the use of mercury, *eczema mercuriale*. Both of these are merely forms of simple eczema. In infants at the breast and in children

* Skin Diseases: their Description, Pathology, Diagnosis, and Treatment. Second edition, p. 97. London, 1869.

during dentition, this disease—*eczema infantile*—is often very severe and obstinate. It may extend over the whole body; becoming complicated with erythema, impetigo, pityriasis, and in fact with almost every eruption that the skin seems liable to. The general health of the infant becomes much depressed.

All the varieties of eczema are often obstinate, and for a time will resist the power of medicines. Mild local applications, such as thin gruel, barley-water, linseed-tea, lead lotion, or linen rags dipped in warm water and covered with oiled silk, are useful. Frequent bathing with warm alkaline or starchy water is very soothing. I have found the glycerin of starch, or a lotion of glycerin and water in equal parts, very beneficial in some instances; while in a few others a small portion of a mixture of equal parts of soft (potash) soap and the officinal tar ointment, rubbed in night and morning, has answered better. The officinal lime liniment (the old carron oil) has been recommended; and so have lotions containing belladonna or corrosive sublimate, sulphur ointments, the ointment of nitrate of mercury diluted with lard, as well as the ointment of ammoniated mercury (white precipitate). The latter is very useful where there is thickening and induration of the skin. Great attention to cleanliness will be needed. The scabs ought to be thoroughly saturated with washed lard or olive oil, and then removed by linseed poultices; for as long as any crusts remain it is impossible properly to affect the diseased surfaces with local remedies. Moreover, such crusts are in themselves very irritating, while they may even set up inflammation.

The general treatment must consist in the use of warm or tepid baths, a plain diet with fresh meat and plenty of milk, and daily walking exercise. As regards medicines, there may be needed saline laxatives or an occasional dose of blue pill and colocynth, slightly acidulated drinks, opiates to relieve the irritation, sarsaparilla, the mineral acids, &c. Supposing the kidneys act inefficiently, diuretics had better be prescribed; the two best agents of this class for the present purpose being simple water in large quantities, and the acid tartrate of potash (cream of tartar) very freely diluted. As regards severe or chronic cases the remedies which have proved most efficacious in my hands have been steel, quinine, arsenic, and cod-liver oil. Sometimes one of the first three agents has been administered separately; but often it has appeared advisable to give them in combination (F. 381). Supposing improvement has been manifested for a few weeks, and the case should then have become stationary, benefit has resulted from substituting the corrosive sublimate with sarsaparilla (F. 27) for the tonics. Moreover, where there has been any evidence of gout in the system, colchium (F. 46) has been employed; when rheumatism has been present, iodide of potassium and bark (F. 31), or iodide of iron (F. 32), have been trusted to; where the nervous system has appeared depressed the hypophosphite of soda or lime (F. 419) has been prescribed; while if there has appeared to be any syphilitic taint, mercurial vapor baths (F. 131) have been ordered, and the red iodide of mercury (F. 54) has been administered by the mouth. During the greater part of 1868 the widow of an eminent physician took full doses of arsenic for the cure of very obstinate eczema, and for a time with advantage. Matters then came to a standstill, or even retrograded. Without much hope I prescribed two tar capsules (F. 36) thrice daily, and with such astonishing benefit that I rather sank in the patient's estimation for not having resorted to this agent at the commencement of the treatment. A complete cure seems to have resulted.

In eczema infantile the child's bowels had better be acted on by a few doses of magnesia, or of rhubarb and magnesia, or of calomel. Then care

ought to be taken that the milk on which the patient is fed is pure and good. Scabs are to be removed by olive oil and bread poultices; while the local distress is to be relieved by the free application of zinc ointment, or of ointment of acetate of lead, or of a lotion of elder-flower water. Finally, the blood is to be restored to its healthy condition by the employment of the arsenical solution (one minim may be given to an infant three or four months old, thrice daily) in a little steel wine and syrup, or in chemical food (F. 405). One teaspoonful of cod-liver oil, twice or thrice a day, on a little sweetened orange juice, will always prove most valuable, especially during the winter months.

ORDER III. BULLÆ.

As a general rule, bullæ differ from vesiculæ merely in being larger; and hence it is almost unnecessary to separate them into two orders. Bullæ [from *Bulla* = a bubble of water] consist of variously shaped superficial tumors or blebs, caused by effusions of serum beneath the epidermis; the bladders bursting after a few days, while their contents form thickish crusts. Pemphigus and rupia are the two eruptions which are classed under the denomination of bullous diseases.

1. PEMPHIGUS.—This affection is characterized by the appearance of large round or oval bullæ or blebs, each being two or three inches in diameter, upon one or more regions of the body. Each bleb is filled with ordinary alkaline serum; which after a time loses its transparency, and then becomes acid and puriform. The eruption in pemphigus [from Πέμφιξ = a bubble or blister] is generally preceded for twenty-four or forty-eight hours by slight general indisposition, fever, and itching of the skin. Small red circular patches then form, which gradually increase in extent, and become covered with bullæ; these either fading away on attaining their full size, or bursting and being replaced by thin brownish-colored incrustations. There may be only one bleb (P. solitarius), or a dozen or two. The duration of this disease is commonly from one to three weeks, although it occasionally becomes unusually chronic and is prolonged for months. The subjects of it are almost always more or less debilitated. Elderly people now and then have some four or five bullæ developed about the ankles or wrists, giving evidence that they are out of health. It is important under these circumstances to examine the urine, as there is ofttimes either sugar or albumen present. Moreover, I have seen a few marked cases of pemphigus in pregnant women who have been badly fed.

Pemphigus sometimes attacks infants within a short time after birth. The bullæ usually appear on the palms of the hands or the soles of the feet, or more seldom about the buttocks; and as they burst, unhealthy (perhaps sloughing or gangrenous) ulcers are often disclosed. Unless these cases are promptly treated, the disorder rapidly runs on to a fatal issue. Diarrhœa and vomiting set in, the little patient quickly becomes greatly emaciated, and death occurs from exhaustion. The only remedy which has appeared to me to have any beneficial effect in pemphigus neonatorum has been a simple solution of raw meat; while it has also been found necessary to have the infant fed by a healthy wet-nurse. It has never seemed advisable to trust to the mother in these cases. Moreover, where the child has

presented any indication of syphilis, chlorate of potash (from two to five grains thrice daily) has been given.

Pompholyx [from *Πομφὸς* = a blister] is merely a variety of pemphigus, unattended with fever, and running its course in eight or ten days: it is very rare. A kind of artificial pompholyx may be produced by the application of cantharides. I remember a young woman in King's College Hospital who deceived all who saw her for a short time by rubbing powdered cantharides into various parts of her person, and thus raising numerous small blisters. Particles of the fly were detected with a lens.

Tonic medicines, rest from work, and warm clothing, with generous diet and fresh air, appear to be the remedies called for in the management of pemphigus. Hence ammonia and bark (F. 371), nitro-hydrochloric acid and some bitter infusion (F. 378), or quinine and iron (F. 380), should be prescribed. For the aged or very weakly, cod-liver oil is useful. As an aperient, if one be needed, the effervescing citrate of magnesia answers well. In any obstinate cases, arsenic with quinine and steel (F. 381) will certainly effect a cure. Most practitioners agree that it is better to puncture each blister with a fine needle, directly it has formed. Care should be taken that the cuticle is not rubbed off. There are few applications better than water-dressing for any superficial ulcerations which may result.

2. RUPIA.—Rupia [from *Ῥύπος* = filth; in consequence of the foulness of the affected parts] may be considered as a modification of pemphigus occurring in persons of debilitated constitutions, and especially in those whose systems have been contaminated with the poison of syphilis. The disease is characterized by the eruption of isolated flattened bullæ; the blebs containing at first serous fluid, which soon becomes purulent or sanguinolent. The blebs and their contents then concrete or dry into dark and black and rough scabs. The margins of the surrounding skin inflame; more serum continues to be poured out; and thus the incrustation increases in circumference and thickness until it somewhat resembles the shell of one of the mollusca. When the crusts fall off they leave circular ulcers, of various sizes, indisposed to heal, and which often only cicatrize after the lapse of many weeks; ugly red or brownish marks being left, which persist for very many months. The loins and lower extremities are most frequently affected. The duration of rupia varies from two or three weeks to several months. There is seldom any danger, unless a great deficiency of vital power be present.

Three forms of this disease are usually described. When the crusts are thin, and the ulcers beneath them superficial, we speak of *rupia simplex*. If the crust be large (from three or four to eight or nine lines in thickness), constituting the marked feature of the case, the disorder is known as *rupia prominens;* the surrounding skin puts on an erythematous blush. While, where the ulceration is extensive and deep and spreading, *rupia escharotica* (synonymous with *pemphigus gangrænosus*) is the technical term employed to distinguish this coarse variety. Weakly children, especially if they are insufficiently fed and imperfectly washed and clothed, are apt to suffer from rupia escharotica; foul and ragged and painful ulcers being produced about the thighs and nates and loins, so that the already bad health deteriorates still more until perhaps even death results.

Warm baths, generous diet, wine, cod-liver oil, and bark with nitric acid, or quinine with tincture of serpentary, will constitute the remedies to be trusted to. Where there is any indigestion, a dose of pig's pepsin with a couple of grains of reduced iron taken during dinner acts most favorably. Change of air is often very serviceable. In syphilitic rupia,

which may commonly be diagnosed by the skin around the dark and hard crusts having a coppery hue, iodide of potassium (F. 31) will generally effect a cure. Where the system is much depressed, iodide of iron and cod-liver oil had better be trusted to. The bullæ ought to be punctured early in all cases.

ORDER IV. PUSTULÆ.

The pustular affections of the skin are characterized by the formation, between the cuticle and cutis vera, of small tumors or pustules containing purulent fluid. The pustules are sometimes scattered irregularly, sometimes united in clusters; they vary in their shape and degree of elevation, as well as in the size of their inflamed bases; while they are succeeded by irregularly formed scabs, and frequently by permanent cicatrices. The diseases of this class are—ecthyma and impetigo. Small-pox is often ranged with the pustular diseases.

1. **ECTHYMA.**—Ecthyma [from *Ἐκθύω* = to break out in eruptions] is a non-contagious inflammation of the skin; characterized by large and prominent pustules, with hard and inflamed bases, occurring upon any part of the body. These pustules or phlyzaciæ are usually distinct, they are seated upon a hard inflamed base, and they terminate in thick dark-colored scabs. The latter leave superficial ulcers, followed by cicatrices. The disease may be acute; being preceded by lancinating burning pains in the limbs or other parts about to be affected, as well as by feverishness. More commonly, however, ecthyma is chronic, and is often one of the ills of poverty; resulting from the use of improper or innutritious food, from debauchery, from exposure to damp, and from residence in close rooms. In *ecthyma cachecticum* the ulcers assume an unhealthy appearance; while the general health, which was bad prior to the eruption, becomes still more deteriorated. The lower the constitutional powers, the more chronic will be the disease.

Ecthyma will frequently occur spontaneously; or it is often met with as a sequela to some other disease—as one of the eruptive fevers, syphilis, &c.; or it may result from some irritant applied to the skin. Thus it is easily produced by croton oil liniment, or by the ointment of tartarated antimony; the irritation caused by handling sugar gives rise to it—grocer's itch. When arising without any apparent cause, young persons appear to be most obnoxious to it, especially in the spring and summer. The eruption may be very partial, or it may almost cover the body; and it will possibly continue troublesome for many weeks, sometimes one crop after another appearing in rapid succession. In badly nourished infants it is often met with about the face and scalp, as well as over the chest and lower limbs.

The *treatment* of the acute form must consist in the use of gentle laxatives, slightly acidulated drinks, and a nourishing diet. Water-dressing, or the subacetate of lead lotion, or the elder-flower ointment of the London Pharmacopœia, or the zinc ointment of the last British Pharmacopœia, may be applied to the pustules. In the chronic variety, stimulants and generous living should be allowed; while the health is to be improved by cod-liver oil, quinine and iron, and warm, or tepid, or gelatin baths. Where the disease is very chronic, a cure will be effected by combining small doses of arsenic with the ferruginous tonic.

2. IMPETIGO.—Impetigo [from *Impeto* = to attack; terminal *-igo*] is a severe, sometimes contagious, purulent inflammation of the skin. It is described as pustular eczema by some writers. The disease is characterized by an eruption of small hemispheroidal or flattened pustules or psydraciæ; which are most frequently grouped in clusters, which have a tendency to run together, and which form thick and moist yellowish scabs or incrustations. From the psydraciæ, as well as from beneath the incrustations, a sero-purulent or puriform discharge takes place; while the crusts become thicker and larger, until they fall off, leaving a raw surface. The mode of distribution of the pustules has caused a division of the disease into two varieties, *impetigo figurata* and *impetigo sparsa*. The first kind occurs generally on the face, especially on the cheeks; it is attended with febrile and other constitutional disturbance, and often with swelling of the lymphatic glands; while, as the psydracious pustules (which are arranged in round or oval or irregular groups) burst and form scabs, the heat and itching become intolerable. In children, the impetiginous eruption and its yellow tenacious secretion sometimes cover the face or head like a mask, the disease being called *crusta lactea*, or *porrigo larvalis*, or *melitagra*, from the honey-like appearance of the discharge; it is now and then originated by the irritation set up by the presence of the pediculus capitis. The second form of impetigo slightly differs from the first, inasmuch as the pustules are more scattered; being sometimes irregularly distributed over an entire limb, or even over the whole body. Both varieties may be looked upon as diseases almost peculiar to the poor. Amongst the lower orders, the ill-fed and the scrofulous are those who chiefly suffer.

When there is much inflammatory action the patient ought to be kept very quiet, and on a light diet with a free supply of diluents. The bowels must be acted upon by saline purgatives. The best local applications are lotions containing extract of poppies, or lead, or the oxide of zinc, or hydrocyanic acid, or creasote, or glycerin; dusting the affected part with the oxide of zinc, or with the impure carbonate of zinc, occasionally relieves the irritation. Vapor or warm water baths are always beneficial. The scabs ought to be removed by poultices or water-dressing, and by ointments. Creasote ointment, after the scabs have come off, is useful. The ointment of nitrate of mercury, or that of the red oxide of mercury, may also prove valuable. If the scalp or beard be involved, the hairs will have to be cut short. The constitutional treatment must consist in paying attention to the diet, forbidding stimulants but allowing plenty of milk; together with recommending the use of mild laxatives, alkalies, and tonics—especially quinine. Arsenic is sometimes required; while cod-liver oil may be said to be indispensable.

ORDER V. PAPULÆ.

Papulæ [from *Papula* = a pimple] are small, solid, acuminated elevations of the cuticle, resembling enlarged papillæ of the skin. They generally terminate in resolution or in slight desquamation, but sometimes in ulceration of their summits. Papular eruptions are usually preceded by itching; they are rarely accompanied by fever; they are slowly formed; they are not contagious; they may be developed on any part of the body; and they are sometimes very troublesome, varying in their duration from a

week to several months. Strophulus, lichen, and prurigo are the diseases of this class.

1. STROPHULUS.—This papular disease, commonly known as red gum or tooth rash, is peculiar to infants and young children. By some dermatologists, however, strophulus is regarded as lichen modified by the delicate skin of the infant. Strophulus is characterized by an eruption of minute, hard, sometimes slightly red, and clustered or scattered pimples; which may appear upon a part, or extend over the whole surface of the body. The pimples are most common on the face and neck. The irritation is slight. The affected surface may be moist, and there is desquamation.

Several varieties of strophulus have been described, according as the papulæ appear to be large or small, scattered or grouped. But whether the papules are scattered, with vivid red blushes or dots interspersed among them, as in *strophulus intertinctus;* or whether the eruption is copious and confluent, as in *strophulus confertus;* or whether the spots are white and large, often resembling fleabites, as in *strophulus candidus;* or whether the papulæ form circular patches, which come out successively in different parts of the body, as in *strophulus volaticus,* whichever variety is present is really of little moment. For practically all forms are due to stomach or intestinal derangement; this derangement being the consequence of improper feeding, or of irritation about the gums from dentition. In infants brought up by hand, the acidity of cow's milk often produces diarrhœa and sometimes red gum. To prevent these results, and to make the milk more nearly resemble that of the human female, it ought to be rendered slightly alkaline by the addition of a few grains of carbonate of soda or of bicarbonate of potash to each pint. Even in infants who are properly nursed but who are suffering from strophulus, care should be taken to ascertain that the mother's milk is natural. Then, if there be constipation, a little rhubarb and magnesia in dill-water may be given; or if there be any diarrhœa, a few doses of chalk mixture will be required. Where the eruption seems connected with dental irritation, lancing the gums often gives complete relief. If there be any troublesome itching, a little oxide of zinc ointment, or glycerin and rose-water, or a dusting powder of starch or calamine, should be applied; while small doses of the syrup of iodide of iron are administered internally. In all forms attention must be paid to cleanliness; as well as to having linen next the skin instead of irritating flannel.

2. LICHEN.—Lichen [from Λειχήν = moss] is an obstinate and annoying papular affection. It may be readily recognized by the minute and hard, dry and red elevations of the skin which it presents, and which are either distinct or arranged in clusters; by the tingling and itching that accompany the eruption, as well as by the slight desquamation which follows its fading.

According to Willan, there are seven species of this eruption: 1. *Lichen simplex,* in which there is an eruption of red inflamed papulæ, appearing on the face or arms, and extending to the trunk and legs. There is slight fever, with itching or tingling; the eruption begins to fade in about a week, when desquamation takes place, and the disease is apt to return every spring or summer in individuals of an irritable constitution. This form is sometimes mistaken for measles or for scarlet fever. 2. *Lichen pilaris,* or hair lichen, is a modification of the preceding, the papulæ appearing only at the roots of the hairs. It is often due to stomach derangement, es-

pecially such as arises from the abuse of alcoholic drinks. 3. *Lichen circumscriptus*, or clustered lichen, is characterized by patches of papulæ which have a well-defined margin, and an irregularly circular form. 4. *Lichen agrius*, or wild lichen, is by far the most severe form, and is ushered in with fever. The papulæ are much inflamed, and are developed on an erythematous surface, which appears hot and painfully distended. In a short time the inflammation diminishes, and the papulæ become covered with a furfuraceous desquamation; or their points are scratched off, the skin around them becomes fissured into deep and painful cracks, and a seropurulent fluid exudes which dries into thin scaly crusts. The itching, tingling, and smarting are often very intense; there is usually fever, nausea, headache, rigors, and other symptoms of constitutional disturbance; while, although in mild cases, the symptoms may subside and the eruption die away in about fourteen days, yet in severe varieties the disease is frequently prolonged for several months. Women are said to suffer more frequently than men from this variety. 5. *Lichen lividus* is distinguished by the livid hue of its papulæ, which chiefly form on the limbs, and are not accompanied by fever. 6. *Lichen tropicus*, or prickly heat, is peculiar to tropical climates. It appears to be partly due to exposure during the heat of the day, before the system has become acclimatized. 7. *Lichen urticatus*, or nettle lichen, is peculiar, inasmuch as its commencement is marked by the occurrence of wheals, like those which are produced by the bites of bugs or gnats. These wheals soon subside and leave papulæ, which are sometimes obstinate; both wheals and papulæ being accompanied with itching, pricking, and tingling.

The *treatment* of all forms of lichen except the fourth and fifth is, as a rule, simple; for tepid baths, mild laxatives, an unstimulating diet, and acidulous drinks, will most times effect a cure. The irritation will be best relieved by a weak lotion of the liquor plumbi subacetatis, to which a little laurel-water or hydrocyanic acid has been added; or by equal parts of the subacetate of lead and oxide of zinc ointments; or by a lotion consisting of one ounce of glycerin, six grains of corrosive sublimate, twenty or thirty drops of chloroform, and seven ounces of water.

In lichen agrius, however, alterative remedies will be required. Sometimes, especially where the skin is thickened, a mixture of corrosive sublimate and bark (F. 27) acts very favorably; in other cases, arsenic (F. 52) has certainly proved more useful. Occasionally I have found it advantageous, where the disease has proved very refractory, to administer arsenic, while about twice a week a mercurial vapor-bath (F. 131) has been employed. The sulphur-baths (F. 125, 126) are strongly and justly recommended by some authorities.

With regard to lichen lividus, it is only necessary to say that our remedies must be such as impart tone to the system. Local stimulation of the skin is unadvisable. A generous diet with a moderate allowance of Bordeaux or Hungarian or Greek wine, quinine with one of the mineral acids (F. 379), and cod-liver oil, are the agents to be trusted to.

3. PRURIGO.—Prurigo [from *Prurio* = to itch; terminal *-igo*] is a cutaneous disease characterized by an eruption of small papulæ or pimples, almost of the natural color of the skin. Frequently, the disease is a simple neurotic affection; the exalted sensibility, or hyperæsthesia, being unattended by any appreciable change of structure. Under all circumstances, prurigo is a chronic affection; lasting for months or years, and causing great discomfort, not to say misery. The itching or pruritus is intense in most cases. Patients afflicted with it scratch and tear themselves con-

stantly till the blood flows; their sufferings being aggravated by stimulants and warmth. Willan describes three varietes—*prurigo mitis*, *prurigo formicans*, and *prurigo senilis*. The first is the mildest form; the itching is seldom unbearable, but it becomes worse towards evening. In the second variety the annoyance is very great, frequently preventing sleep during the early part of the night; the pricking and burning sensations are compared to the creeping of numberless ants or the stinging of insects. The third kind is still more distressing; it occurs in old persons, and is most obstinate, often continuing for the rest of the patient's life. The skin becomes rugous and somewhat thickened; while commingled with the papulæ are found patches of erythema and urticaria, small pustules, &c. The general health suffers, inasmuch as the complaint renders life miserable. Severe pain is less intolerable than aggravated prurigo.

Prurigo may attack the cutaneous surface generally, or it will be found limited to certain districts. From the latter peculiarity we are in the habit of speaking of prurigo scroti, p. pubis, p. podicis, when the skin round the anus is attacked, and p. pudendi, when the parts around the female vulva and perineum are affected.

The itching arising from prurigo must not be confounded with that caused by insects. To prevent any error, not only must the skin be carefully examined, but also the patient's underclothing. Some authorities appear to believe that all cases of prurigo senilis are due to lice, the pimples arising from the friction and scratching. Without indorsing this extreme view, I believe it applies correctly to a large number of cases.

In attempting the cure of prurigo, hot alkaline (F. 121), sulphur (F. 125), conium (F. 122), creasote (F. 123), or even plain water-baths, should be used daily. The Turkish bath, where there is no disease of the heart or large bloodvessels, can often be taken twice or thrice a week with great benefit. The local applications which give the most relief, are vinegar, lime-water, tobacco-water (F. 265), a weak solution of corrosive sublimate, a dilute solution of carbolic acid, a lotion containing prussic acid or laurel-water, an ointment prepared with a small quantity of aconitin, tar ointment, &c. Attention will have to be paid to cleanliness, both of the body and apparel; while the less the patient scratches himself, the better. If there be lice, of course pains will be taken to destroy them; if thread-worms infest the bowel, they must be thoroughly expelled; if there be uterine disease, all remedies will fail till this be cured.

The general treatment must consist in the use of a light and cooling regimen; the avoidance of stimulating food or drink; and the employment of laxatives (F. 148, 153, 165). Where the kidneys do not act efficiently large doses of acetate of potash, freely diluted, are indicated. Then the practitioner can select, according to circumstances, either sarsaparilla and iodide of iron (F. 32), tar in pills or capsules (F. 36), acid tonics with taraxacum (F. 376, 377, 378), or even arsenic in full doses (F. 52, 399). Occasionally, small doses of strychnia with cod-liver oil prove very serviceable.

With the object of affording temporary relief to the irritation, recourse must ofttimes be had to the internal administration of sedatives. Of the various drugs belonging to this class there is not one that can be especially recommended. Perhaps the best is belladonna; about fifteen minims of the tincture in two fluid drachms of syrup of poppies now and then sufficing to give a good night's rest. In other cases, full doses of hyoscyamus answer well. Opium acts like a charm in some instances, and greatly aggravates the annoyance in others. Morphia is usually injurious; but if tried, it is best to use it subcutaneously with a minute dose of atropin (F. 315). Aconite, conium, digitalis, and stramonium are very uncertain in their action.

ORDER VI. SQUAMÆ.

The term Squamæ [from *Squama* = a scale] is applied to the scales of degenerated, thickened, dry epidermis which cover minute papular elevations of the skin; these scales or particles of scurf being readily detached, though they are reproduced by successive desquamations for a long time. The scales or scurf are the result of a morbid secretion of the epidermis. Their formation gives rise to but slight constitutional disturbance, and to mere local heat and itching; while none of the squamous diseases are contagious, though they are very chronic in their duration. Psoriasis (including lepra), pityriasis, and ichthyosis are the disorders which range under this division.

1. PSORIASIS.—Psoriasis [from Ψώρα = tetter], psora leprosa, alphos, or dry tetter, is a chronic non-contagious inflammation of the derma. It is characterized by the development of dry and indistinctly copper-colored patches of various extent and form, which are slightly raised above the level of the skin; these patches being covered by thin and adhesive and whitish or silvery scales of altered epiderma, and being accompanied by rhagades or fissures (with an insignificant thickening) of the skin. Whether there are distinct varieties of psoriasis, or whether what are so termed are merely different stages of the same disease (as Dr. McCall Anderson's writings have led me to believe) is not of much consequence. Suffice it, that as forms or stages of this disorder we have to recognize psoriasis vulgaris, p. guttata, p. diffusa, p. gyrata, and p. inveterata. The cutaneous eruption which has long been known as *Lepra* [Λέπρα = a scaly state of the skin] is now allowed to be merely a variety or a declining stage of psoriasis, and not a separate affection. As a rule, the general health is not appreciably affected in psoriasis; there being few if any symptoms beyond slight itching, and the sense of annoyance which results from having "a skin disease."

Psoriasis vulgaris (the lepra vulgaris of Willan, the alphos circinatus of Erasmus Wilson) is the most common form of this disorder. The dry silvery scales formed of epithelium, situated on tawny-red patches of skin, are at first very small, though they sometimes increase rather quickly in size. They are most often seen about the elbows and knees. The disease next appears upon the back, the chest, the inside of the thighs, &c., but rarely on the face. *Psoriasis guttata* (the lepra alphoides of Willan, the alphos guttatus of Erasmus Wilson, the lepra guttata of Tilbury Fox) is peculiar, inasmuch as the scattered patches are said to give an appearance to the skin as if it had been splashed with mortar. The patches are mostly seen on the trunk, and next on the limbs. *Psoriasis diffusa* (the lepra inveterata of Willan, the l. diffusa of Tilbury Fox, and the alphos diffusus of Erasmus Wilson) is merely remarkable for the great extent of the patches; these not uncommonly covering an entire limb, or even a great portion of the cutaneous surface. This diffusion is not only due to the spreading of the disease by its gradual encroachment on healthy tissue, but also to the recurring development of new spots. In *psoriasis gyrata* (alphos gyratus, lepra gyrata, &c.) the eruption takes a serpentine form, owing to the irregular commingling of the circles of the rash. Lastly, *psoriasis inveterata* (lepra inveterata, &c.) is that form in which the disease is chronic, the scales are thick and large and cracked, and the subjacent skin is red and hot and tender. There may even be a more or less copious serous exudation, causing the scales to become prominent scabs. It is this form, I sup-

pose, which is described by Dr. McCall Anderson as "psoriasis rupioides;" the large conical crusts marked by concentric rings resembling the scabs of rupia. There is, however, no connection between psoriasis rupioides and rupia except in the shape of the scabs; for on removing them in the former no ulceration is found, but only a dusky-red and slightly weeping surface.

Looking at the different phases of psoriasis as combined in one affection, the following points may be noticed: The elbows and knees are the favorite sites of this disease, although every part of the body, including the head, may suffer; even the nails are at times invaded. Psoriasis confined to the palms of the hands or the soles of the feet is invariably of syphilitic origin. Psoriasis is a chronic affection; relapses are common, a permanent cure being an exceptional occurrence. Psoriasis is often hereditary. The causes usually assigned—stomach derangements, chlorosis, tuberculosis, rickets, pregnancy, lactation, change of life, amenorrhœa, &c.—probably have no influence in exciting psoriasis. Yet where a predisposition to the disease exists, whatever lowers the tone of the system may suffice to call it out. In syphilitic psoriasis the general health is usually bad; while other traces of the poison—sore throat, distinctly copper-colored patches of erythema, nodes, &c.—will probably be present.

Were I asked to mention briefly the remedies for psoriasis, in the order of their efficiency, I should reply, arsenic, cod-liver oil, and the local application of tar (the officinal unguentum picis liquidæ). Usually, it is better to employ all three simultaneously. Doubtless there are very many cases where these, like all other remedies, fail. The practitioner may then, if it so please him, ring the changes with quinine, iron, phosphorus, the hypophosphite of lime or soda, tar capsules, cantharides, colchicum, iodide of potassium, &c. In syphilitic psoriasis, however, arsenic proves useless; in such, a cure can only be wrought by mercury in some form or other, and notably by the mercurial vapor-bath (F. 131). Where patches of syphilitic and non-syphilitic psoriasis are found to coexist, the triple compound of iodine and arsenic and mercury, known as Donovan's solution (F. 51), can be cautiously given with the prospect of great benefit.

During an arsenical course (F. 52) all acidulated drinks, fruits, and most vegetables had better be abstained from. Moreover, the dose of arsenic should not be too large. I have so frequently found the liquor arsenicalis in five-minim doses quickly disagree, that I generally prescribe only three minims, thrice daily, upon a full stomach; increasing this quantity after a few weeks, if there be evidence that the metal is well borne by the stomach and system generally. When, however, the edges of the eyelids become sore and irritable, when there is any sense of nausea or any tendency to fainting, and when the silvery coat upon the tongue, which results from the use of arsenic, becomes well marked, the dose should be diminished. Moreover, under such circumstances it will be as well for the patient to be seen every four or five days.

2. PITYRIASIS.—Pityriasis [from *Πίτυρον* = bran], or dandriff, or branny tetter, is a superficial and chronic inflammation of the skin, attended with redness and itching, and characterized by the production of minute white scales or scurf in great quantity. It may attack any region; but the scalp and parts covered with hair are the most common seats of it (*Pityriasis capitis*). The desquamation takes place copiously and incessantly. This affection is often very rebellious to treatment, and may be prolonged for several months; in which cases it gives rise to much annoyance, with slight constitutional disturbance. When the disease occurs in red and rough patches, with chronic and deep inflammation of the true

skin, and a profuse exfoliation of fine epidermic cells, it is known as *pityriasis rubra*. This form is very rarely met with. It lasts for years, gradually spreading over the whole body. Although at first there may be little or no constitutional derangement, yet ultimately it causes great weakness, and may even lead to fatal exhaustion.

Some tonic infusion, an occasional purgative, and the use of sedative or alkaline lotions to the affected part, are the measures to be employed. In obstinate cases, however, arsenic (F. 52) has appeared to me to be the only remedy to be depended on. Occasionally the nitrate of mercury ointment, or the ointment of ammoniated mercury, does much good, applied two or three times a week. Glycerin is an excellent local palliative. When the head is the part affected, the hair should be cut off close to the scalp with a pair of scissors. Great cleanliness is, of course, essential. The diet ought to be nourishing, with plenty of milk; stimulants being forbidden unless they are required to aid digestion.

3. ICHTHYOSIS.—Ichthyosis [from *Ἰχθύς* = a fish], or the fish-skin disease, is characterized by the development, upon one or more parts of the integuments, of thick and hard, dry and imbricated scales of a dirty gray color; these scales resting upon an uninflamed surface. The eruption is unattended by heat, pain, or itching. The scales, or shagreen-like flakes, when shed, have sometimes been found to measure three-quarters of an inch in thickness. Ichthyosis is said to be a congenital disease, and to last during life. Examples of it are very seldom met with.

Simple warm and alkaline baths, or vapor-baths, may be employed as palliatives; but no other treatment seems to be of any use. Donovan's triple solution (F. 51) might be tried—perhaps with cod-liver oil.

ORDER VII. TUBERCULA.

The diseases belonging to the order Tubercula [from *Tuberculum* = a little protuberance], are elephantiasis Arabum, molluscum, acne, framboesia, keloid, and vitiligo. They are all characterized by the formation of small hard tumors or tubercles; which are more or less prominent, circumscribed in form, and persistent. The tumors may become ulcerated at the summit, or they will perhaps terminate in suppuration. Tubercular diseases are slowly developed, and are very chronic; the most formidable are peculiar to tropical regions; and the symptoms of all are so characteristic that their diagnosis is free from any difficulty.

1. ELEPHANTIASIS ARABUM.—This disease is in no way connected with that terrible and dangerous constitutional affection known as *True Leprosy*, or the *Eastern Leprosy*, or *Elephantiasis Græcorum* (p. 146).

Elephantiasis Arabum, or elephas, or Barbadoes leg, or bucnemia tropica, or boucnemia, is characterized by great swelling and induration of the true skin or derma, producing marked deformity. The subjacent connective and adipose tissues are also implicated, being greatly hypertrophied and infiltrated with a homogeneous morbid secretion; while as the result of intermittent attacks of lymphangeitis the lymphatic vessels are found obliterated. The disease may be not improperly compared to an aggravated and permanent form of phlegmasia dolens. Boucnemia may affect the face

and neck, or the arms, or the pudendum, or the scrotum. Most frequently, however, it attacks the lower extremities, commencing about the feet and ankles. It causes swelling so great that the limb becomes double its natural size. There is also hardness, and a brawn-like thickening of the integument; so that the latter in its hypertrophied state almost conceals the foot, giving rise to an appearance resembling the leg of an elephant, whence the disease has derived its name [*Ἐλέφας* = the elephant]. There is a tendency to erysipelas and other unhealthy forms of inflammation in this affection. It is rarely met with in Europe, occurring principally in the West Indies, China, Africa, &c. Elephantiasis generally continues for life; it ultimately causes alarming constitutional disturbance; it is neither contagious nor hereditary; and it attacks males and females, rich and poor, indiscriminately.

The treatment of boucnemia has attracted much attention of late years. Formerly, when the disease was confined to one foot and leg, amputation of the limb was resorted to with considerable success. Milder measures, however, are now found to be efficacious. Complete rest, with elevation of the limb and compression by bandages having failed, surgeons were led to try the effect of obliterating the main artery of the limb. This has been accomplished sometimes by the ligature, sometimes by pressure. The rationale of this operation is not very clear. Probably, however, it acts by temporarily cutting off the supply of nutrient fluid to the diseased structures. Directly this is accomplished, these structures begin to degenerate: while with such degeneration, the process of absorption goes on very quickly. For just as we know that absorption of the living elements of a healthy tissue is an impossibility, so the further a morbid structure is removed from a condition of health, the more efficient and speedy may be the action of the absorbents in getting rid of it. As this explanation will probably be deemed inconclusive, it is fortunate that we can fall back upon the results of the proceeding and assert that they appear to be generally favorable.

The main artery of the limb has now been tied in boucnemia on several occasions, and with the following results: (1) Dr. Carnochan, of New York, has ligatured the femoral artery in five cases, and each time successfully. (2) Mr. Butcher, of Dublin, tied the femoral, a cure resulting. (3) Dr. Fayrer, of Calcutta, tied the femoral artery of a Bengali, for elephas of the right leg of seven years' duration, on February 25th, 1865; death ensuing from pyæmia on March 14th. This gentleman operated in the same way, on a second Bengali, on June 22d, 1865. On the day following, the foot and leg had shrunk greatly. Subsequently, however, the patient had attacks of "elephantoid fever," and the hypertrophy returned. (4) Mr. Alcock, of Stafford, has cured one case by tying the femoral. (5) Mr. Bryant, of Guy's Hospital, has effected one cure by ligaturing the external iliac; improvement setting in immediately after the operation, and the progress of the case being one of uninterrupted success. (6) Dr. Watson, of Edinburgh, tied the femoral; the result being improvement. (7) Dr. George Buchanan, of Glasgow, tied the external iliac on December 21st, 1866. There was great improvement at first. But subsequently, the patient had two or three attacks of erysipelas in the limb; and the disease recurred, "at least to a considerable extent." And (8) Mr. Statham, of the Great Northern Hospital, ligatured the anterior tibial artery in an example of solid œdema of the foot, a cure being accomplished.

With regard to the treatment of this disease by compression some success has also been obtained. Thus, in the case of a girl, 21 years of age, who had suffered from elephas of the right leg for seven years, while the

disease was increasing, a cure was effected by digital compression of the femoral. This compression was used for five days, and on some days for as long as twelve hours. Three years after the treatment, the affected limb was the smaller of the two. The history is reported by Dr. Vanzetti of Padua. In a second instance, at the Royal Free Hospital, in a patient under Dr. Cockle and Mr. Hill, the cure of a case of fourteen years' duration seems to have been accomplished by pressure in combination with bandaging. The femoral artery was compressed, at Scarpa's triangle, by means of the horseshoe tourniquet (at first for a short time, and then permanently), but never to the extent of completely arresting the circulation through the artery. Simultaneously, the limb was at first encased in a starched bandage: later, three simple rollers were used. The reduction of size, when the compression of the artery was permanent, proceeded nearly as rapidly as in cases in which the main trunk had been tied.

Elephas of the genital organs is not uncommonly seen in various parts of India; the natives of Bengal appearing to be especially liable to disease of this kind, though the other residents do not altogether escape its influence. According to Dr. Allan Webb, there are two varieties of elephas; one being due to a peculiar intermitting fever, while the other is the result of the syphilitic poison. Hence, there is simple elephas, invading the scrotum in men and the vaginal labia in women; while there is likewise the venereal form commencing in the prepuce in the male subject, and in the nymphæ with the female.

Dr. Fayrer, of the Medical College Hospital at Calcutta, whose experience in this disease is very large, while of course believing that these growths are the local expression of a constitutional disorder, says that they consist of exaggerations of the natural structures—white and yellow fibre, unstriped muscle of the dartos, skin and areolar tissue—the whole being infiltrated with a quantity of jelly-like albumino-serous fluid. They are concurrent in their growth with repeated paroxysms of periodical fever; which fever recurs in some cases once, in others twice, a month. During these attacks, the tumor is always described as increasing in size; becoming hot, turgid, painful, and sometimes fissured. It may also exude a sanious fluid. With the cessation of fever, there is a cessation in growth; but each attack leaves the morbid mass somewhat larger than it found it. The fever having entirely disappeared, the tumor either ceases to grow at all, or it increases slowly and insidiously. The scrotal hypertrophy is occasionally accompanied by elephas in other parts of the body, or of the limbs. But in the majority of cases that have come under Dr. Fayrer's observation, the disease has been confined to the genital organs. There also appears to be a tendency to fatty degeneration of the heart in these cases.

The size which these scrotal tumors may attain is most remarkable. Mr. Liston removed one which weighed nearly 50 lbs. and the patient did well. Mr. Aston Key extirpated one weighing 57 lbs., but the patient died. To within a short period, Dr. Fayrer had operated on twenty-eight cases, with only six deaths (five from pyæmia, and one from exhaustion). In all the genital organs were not excised. The lightest tumor weighed 5 oz.; the heaviest was nearly 76 lbs. after the blood and serum had drained from it.

2. MOLLUSCUM.—This affection derives its name from the similarity of the tubercles characteristic of it to the eminences growing on the bark of the maple tree. Molluscum consists of one or more small tumors; these varying in size from that of a pea to that of a pigeon's egg, being occasionally of a brown color, while sometimes they are found growing from a broad base, and sometimes from a narrow peduncle. There are two forms:

one is contagious, the other not. In non-contagious or false molluscum, the tumors are formed of fibro-areolar tissue; and may be treated as polypi are treated in other situations, viz., by removal with the scissors or scalpel.

True or contagious molluscum is a rare affection. It consists of a kind of hypertrophy of a sebaceous gland, with an accumulation of sebaceous fatty matter. Whether the disease is really contagious must be regarded as very doubtful. M. Hardy, who is a supporter of the contagious theory, explains the existence of this property by asserting that the spores of a cryptogamic plant are always to be discovered in the tumors of molluscum. A cure of these growths can only be effected by incising them, squeezing out their contents, and applying the nitrate of silver to their walls.

3. ACNE.—Acne [perhaps a corruption of *Ἀκμαί* = pimples on the face at the age of puberty; or, according to some writers, from *Ἀ* = priv. + *κνέω* = to itch, because there is an absence of irritation], or gutta-rosacea, or copper-nose, is a chronic pustular affection; characterized by the presence of small isolated pustules, with deep red bases. The pustules, after suppurating and bursting, leave behind them minute, hard, red tumors, the seat of which appears to be the sebaceous follicles of the skin.

Willan describes three varieties of this disease—acne simplex, acne indurata, and acne rosacea; the characteristic distinctions of which are indicated by their names. Acne simplex and acne indurata are most common about the period of puberty; they appear on the forehead or sides of the cheeks; they are very protracted in their duration, and they frequently leave indelible cicatrices. Acne rosacea attacks the nose, is often connected with some stomach or liver disease, and is mostly seen in persons of advanced years—especially if they have been bons vivants, &c. In the treatment of either of these forms, the diet must be restricted, stimulants of all kinds abstained from, and mild laxatives occasionally employed. Pepsin and other remedies to remove dyspepsia will aid the treatment. Arsenic (F. 52) is the only remedy which I have found of any service in obstinate cases. The uterine functions ought to be attended to in women. The iodide of sulphur ointment sometimes does good in acne indurata; and so does warm bathing. Hot water douches are also serviceable. A good lotion can be made with four grains of corrosive sublimate to eight ounces of the officinal almond mixture. Where the spots are small, the acid nitrate of mercury applied with a pipette can be recommended; care being taken only to touch the apex of the little swelling. An excess of acid should be at once removed with blotting-paper.

The acne punctata described by some authors seems really to consist of little black dots about the nose and chin, &c.; these dots being formed by the retention of sebaceous matter, with the presence of the acarus folliculorum or pimple mite. If from their excess these black specks are unsightly, they can often be removed by rubbing them with a little calomel on several occasions.

4. FRAMBŒSIA.—Frambœsia [from *Framboise* = a raspberry], or pian, or yaws, is a disorder rarely met with in Europe. It is, however, common in Africa, in parts of America, and in the West Indies. Without any precursory symptoms, portions of the skin (especially about the face, scalp, axillæ, or genital organs) are found covered with small dusky-red spots, which gradually become converted into larger tubercles: these tubercles being isolated at their summits but collected together at their bases, and often resembling raspberries or mulberries in their color and form.

The tubercles are generally hard, covered with dry scales, and are sometimes inflamed. If the inflammation spreads, ulceration soon sets in; a yellow sanious discharge resulting, which forms scabs around the tumors. The disease continues for years, or even for life.

5. KELOID.—Keloid [according to some authorities from Κηλή = a tumor + εἶδος = like], kelis, cheloidea, or cancroide, was first described by Alibert under the above names; owing to the disease presenting a flattish raised patch of integument resembling the shell of a tortoise [Χέλυς = a tortoise; terminal *-ides*]. This affection consists of small and nearly flat, tender and cicatricial-looking, excrescences or cuticular folds; which probably are formed by an hypertrophy of the fibrous layer of the derma. The excrescences are one or more inches in diameter, are raised a few lines above the level of the skin, and have irregular forms with slight depressions in their centres; while they are covered with wrinkled epidermis. Sometimes the excrescence resembles a cicatrix left by a burn; which, though soft and velvety on the surface, communicates a sense of density and resistance on pressure. There may be only one tumor, but occasionally there are several. The disease is developed slowly: it rarely ends in ulceration, and sometimes disappears spontaneously merely leaving a cicatrix. Keloid is usually found on the chest between the mammæ, and is very uncommon. It has no analogy with cancer. Arsenic (F. 52) seems to be the only remedy which exerts any beneficial effect upon it. Pressure has been recommended, but it will probably prove worse than useless if tried.

6. VITILIGO.—This is a rare disease which received its name from Willan, owing to his belief that it produced a glistening veal-like appearance of the skin [from *Vitulus* = a calf; terminal *-igo*]. It is characterized by the formation of "smooth, white, shining tubercles, which rise on the skin, sometimes in particular parts, as about the ears, neck, and face; and sometimes over nearly the whole body, intermixed with shining papulæ. They vary much in their course and progress: in some cases they reach their full size in the space of a week (attaining the magnitude of a large wart), and then begin to subside, becoming flattened to the level of the cuticle in about ten days: in other instances, they advance less rapidly, and the elevation which they acquire is less considerable; in fact they are less distinctly tubercular. But in these cases they are more permanent; and as they gradually subside to the level of the surface, they creep along in one direction, as, for example, across the face or along the limbs, checkering the whole superficies with a veal-skin appearance."* The eruption destroys the hairs in its progress: it never advances to ulceration.

Drs. Addison and Gull speak of two varieties,—the *vitiligoidea plana* and *v. tuberosa*, which may occur separately or combined. In the former, irregular yellow patches are observed, slightly elevated and hard; in the latter, there are isolated or confluent tubercles, ranging from the size of a pin's head to that of a large pea. Vitiligoidea (described by Mr. Erasmus Wilson under the name of Xanthelasma) is most frequently seen in the shape of yellowish patches, symmetrically arranged about the eyelids and their vicinity. In some of the cases which have been treated at Guy's Hospital there has appeared to be some connection between this skin disease and derangement of the liver. So again, out of five instances observed by Hebra there happened to be jaundice in three.

* A Practical Synopsis of Cutaneous Diseases, by Thomas Bateman, M.D. Seventh edition, edited by Dr. Anthony Todd Thomson, p. 834. London, 1829.

Vitiligo is sometimes confused with psoriasis guttata (the lepra alphoides of Willan), sometimes with lupus non-exedens. Other writers seem to regard the appearances which are produced as merely due to a diminution of pigment, without any change of texture; thus making it of the same nature as leucoderma. No remedy for the disease is at present known. Iodine may be applied to the patches.

ORDER VIII. PARASITICI.

The order Parasitici must be divided into two groups: the dermatophyta and the dermatozoa; according as the parasite belongs to the vegetable or the animal kingdom. The cutaneous affections depending upon parasitic plants, or epiphytes, are Tinea* tonsurans, Tinea favosa, Tinea decalvans, Tinea sycosis, and Tinea versicolor or Chloasma. Of the diseases produced by animal parasites, or epizoa, Scabies is the one now to be described. All these affections are contagious.

The fact is now generally admitted that both animals and plants are liable to suffer from diseases induced by parasitic fungi,—plants of the lowest type. Some of the plants of this class are familiar to every one; as, for example, yeast, mildew, rust, smut, mushrooms, toadstools, &c. The more minute fungi which find a suitable soil on animal bodies have only been discovered of late years. In all fungi there are delicate transparent filaments, representative of the root-fibres of higher plants. These filaments or threads are known as "mycelium." If by excessive multiplication with repeated forking the filaments get matted together, they are spoken of as "thallus." The fruits of fungi are termed "spores" (sporidia, or sporules); and these round or oval, solitary or collected bodies, consist of granules floating in a fluid, inclosed in a case of cellulose. The spores may be carried by the air from one subject to another; though most frequently they are distributed by actual contact between the bearer and a healthy individual. Parasitic diseases are thus sometimes transmitted from animals to man. Dr. Tilbury Fox, who is one of our first authorities on all these questions, says that mice with favus can communicate the disease to the cat; while this animal subsequently gives favus, or even body ringworm, to the human subject. Certainly, favus is not an uncommon disease of mice and cats, as well as of horses and oxen and calves; so that consequently there is every reason for regarding Dr. Fox's views as correct so far as concerns the communication of favus from the cat to man. With regard, however, to contact with an animal with favus giving rise to ringworm in the human subject, there is room for a difference of opinion. As far as my own experience goes, I am no more inclined to think that tinea favosa can produce tinea tonsurans than that the acarus folliculorum (or pimple mite) can give rise to scabies.

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* This term [from *Tinea* = any gnawing or destructive worm] may be applied generally to all those cutaneous diseases which are due to the presence of vegetable growths. Hebra, of Vienna, believes that all the forms of tinea are produced by the same parasite; the different appearances produced by it depending upon the stage of development of the fungus, the exact nature of the soil on which it is implanted, &c. According to Dr. Tilbury Fox the fungi found on man are of "one and the same stock." On the contrary, this opinion is not that generally entertained.

1. TINEA TONSURANS.—This is a chronic contagious disease, which is far from uncommon. It is recognized by the thickened and whitened, the brittle and broken condition of the affected hairs [whence the name, from *Tondeo* = to shave], as well as by the furfuraceous or branny eruption, and the roundness of the diseased patches. It is called porrigo scutulata, or scalled head, by Bateman and Willan; herpes tonsurans by Hebra; herpes circinatus by Erichsen; trichosis furfuracea by Erasmus Wilson; and vulgarly ringworm. The parasite is the *Tricophyton tonsurans;* the sporules (about $\frac{1}{7000}$ of an inch in diameter) and mycelium of which infiltrate the texture of each hair, while they also spread among the epithelial scales.

Ringworm occurs not only on the scalp but upon other parts of the body, as the neck, trunk, &c. In children it affects the scalp; in young adults it attacks the general surface. It is a local disease just as scabies is. In ringworm of the head, or tinea tonsurans, there is at first an erythematous or else a vesicular eruption (rarely a papular or pustular rash), attended with moderate itching. Then the fungus is seen as a white or grayish powder, while the affected patch is slightly raised. The disease causes the hairs to break off almost close to the scalp; so that one or more somewhat circular patches are seen where the hairs look as if they had been cut short, and where small scales of dry epithelium are found. Moreover, the hairs just around the part appear dry and dirty. The hair-follicles seldom become obliterated in this disease, and consequently permanent baldness need not be feared. The treatment will be described in the section on sycosis.

Ringworm of the body, or tinea circinata, consists of circular and slightly raised patches, which take on furfuraceous desquamation. They are situated about the face, or neck, or breast, or shoulders, or arms. Their margins are more distinctly vesicular or papular than their central portions. The disease spreads at the circumference; while as the parasite is sometimes destroyed by the inflammatory process which it sets up, rings are seen inclosing portions of skin which have become healthy. Tinea tonsurans and tinea circinata often coexist. The parasite is the same in both instances.

2. TINEA FAVOSA.—This parasitic disease is seldom met with. It most commonly affects the scalp (Favus pilaris); whence, by scratching, it is apt to involve the nails (F. unguium). Body favus (F. epidermidis) is a very rare form. Favus as seen on the scalp, when the hair-follicles are attacked, is found in the form of small cup-shaped and yellow crusts; each crust containing a hair in its centre, and somewhat resembling a piece of honeycomb [*Favus* = a honeycomb]. There is rather troublesome itching; the hairs become brittle, and ultimately fall out; while the crusts have a mouldy offensive odor, they are often surrounded with lice, and they are usually small, unless they coalesce, so as to form a large dry mass. The entire scalp may become affected, if proper remedies are not used. This disease occurs mostly in children, and especially in strumous subjects; while according to Hebra it is due to dirt and neglect in cleaning and combing the hair. In cases of long standing, the disease will be found on parts of the trunk, as well as on the scalp, inoculation with the spores having taken place. It may produce permanent baldness by destroying the hair-follicles. The synonyms for this contagious disease are honeycomb ringworm, scall-head, favus, tinea lupinosa, and porrigo favosa. The cryptogamic parasite causing it is the *Achorion Schönleinii;* the sporules of which are round or oval, and about the $\frac{1}{3000}$ of an inch in diameter. There are also smaller tubes, with much granular material. This parasite appears to find its most

suitable soil in the tissue of scrofulous, or of debilitated and neglected children.

3. TINEA DECALVANS.—The third variety of these diseases is easily diagnosed. The hair falls off one or more circular or oval spots; leaving perfectly smooth bald patches, which vary in size, being sometimes no larger than a pin's head, and sometimes extending over the entire scalp [*Decalvo* = to make bald]. Frequently the affected patches look as clean and polished as the surface of a white billiard-ball. The baldness is seldom permanent. I entertain no doubt whatever but that it is contagious, though less so than the other varieties of tinea. Almost always occurring on the scalp, yet, in rare cases, this disease spreads and destroys every hair upon the body, thus inducing considerable deformity. This affection is usually known as porrigo decalvans, or alopecia circumscripta, or alopecia areata. The parasitic fungus is the *Microsporon Audouini;* the sporules of which are round, and much smaller than those of the fungi previously described.

4. TINEA SYCOSIS.—The fourth species of tinea is characterized by spots of erythematous inflammation which involve the hair-follicles, causing successive eruptions of small acuminated pustules. These pustules have been fancifully thought to have a granulated appearance resembling the substance of a fig [Συκόομαι = to become like a fig]. Sycosis, or ringworm of the beard, is met with most frequently upon the chin and other parts occupied by beard; it seldom occurs on the scalp, and rarely affects women. In some cases, it is at least aggravated by the excessive use of alcoholic liquors. It is called mentagra by Willan and Bateman, and sycosis by Cazenave. On extracting a hair it will be seen covered with a whitish powder—the parasitic matter. This is the *Microsporon mentagrophytes,* which is probably identical with the Tricophyton tonsurans.

Treatment.—This is the same in all these varieties of tinea. It consists in constant attention to cleanliness; separation of all scabs or incrustations by the application of oil and simple ointments and poultices; removal of the brittle hairs with the scissors, or careful extraction of them by the forceps (epilation); improvement of the general health by a generous diet, cod-liver oil, and bark or steel; and especially by the destruction of the parasitic plant. By the latter proceeding, the disease will in all cases be cured. It may often be effected by the application of the undiluted sulphurous acid, or of this acid with water as a lotion (F. 272); or by creasote, or carbolic acid (F. 270), or by the officinal glycerin of carbolic acid; or especially by a lotion of corrosive sublimate (F. 271). Sometimes ointments appear to succeed better as parasiticides than lotions. A mixture of equal parts of calomel, creasote, and sulphur ointment is useful; or the nitrate of mercury ointment may be tried; or the corrosive sublimate ointment (F. 299), or the ammoniated mercury and sulphur ointment (F. 300), or the iodide of sulphur (F. 310) can be recommended. In ringworm, the strong acetic acid is a good application, so is the officinal liniment of turpentine and acetic acid, and so is the glacial acetic acid, provided the part be washed directly after its use with cold water; while there will seldom be any necessity for using these acids more than once, supposing the one selected be efficiently rubbed in, and that a small quantity of a pomatum, containing some corrosive sublimate (F. 299), be employed for three or four weeks afterwards. Sometimes I have successfully painted the affected patch with a mixture of one hundred grains of iodine in an ounce of the white oil of petroleum; by which a scab is formed that does not separate for a week at least. Two or three applications, at intervals of fourteen

days, usually suffice. In advanced tinea decalvans good results are obtained from rubbing (or better still from brushing with a hard toothbrush) the glycerin of carbolic acid into the bald patches and surrounding parts twice or thrice a week; occasionally omitting this remedy and substituting a painting with good blistering liquid—the officinal liquor epispasticus.

Finally, in examining and treating all the forms of tinea the practitioner should remember that by chance he may inoculate himself. Such an accident has happened; and it must, to say the least, have been very disagreeable.

5. TINEA VERSICOLOR.—This affection, commonly known as chloasma [from *Χλοάζω* = to be of a greenish-yellow color], makes its appearance generally on the front of the chest or abdomen in the form of small patches of a dull reddish color, which gradually increase in size, and assume a yellow tint. The eruption is often mistaken for a syphilitic stain. Chloasma merely causes a little itching: there is desquamation of small scales like fine bits of bran. Each patch gradually spreads. The disease may last from a few days to many months or years. It is contagious. Want of cleanliness, and the wearing of dirty flannel shirts, seem to favor the occurrence of chloasma by forming a fit soil for the parasite. This, according to Eichstedt, is a cryptogamic plant—the *Microsporon furfur;* the spores of which (about the $\frac{1}{4000}$ of an inch in diameter) can be detected in the branny scales by submitting them to a microscopic examination. The fungus may be completely destroyed by the use of the sulphurous acid lotion (F. 272); or by the glycerin of carbolic acid; or by the liniment of turpentine; or by a liniment of corrosive sublimate in water (F. 271), which ought to be rubbed all over the affected part every night and morning. Mr. Startin considers that it is apt to return, if an arsenical course be omitted; and hence in obstinate cases this remedy may be resorted to (F. 52). I have, however, cured a large number of cases by the mercurial liniment alone, continuing its use for a short time after the disappearance of the eruption. It is scarcely necessary to add that the skin must be kept thoroughly clean; while the dirty habit of sleeping in a flannel waistcoat ought to be abandoned, or at all events the one worn during the day should be changed at night.

6. SCABIES.—Scabies [from *Scabo* = to scratch], or the itch, is a troublesome disease, attended with great itching; the irritation being increased by heat, so that it is often rendered intolerable at night by a warm bed. Scabies commences as a papular, vesicular, or even pustular eruption; the vesicles or pustules becoming ruptured, and excoriations being produced, by the scratching with the nails which is being constantly resorted to. This affection may attack every part of the body; though it most frequently occurs in the flexures of the joints and especially on the fingers, because the skin at these parts is delicate and easily perforated. It is often stated that scabies is never seen on the face; but this opinion is probably incorrect, for I am told that at the Hospital for Skin Diseases cases of its occurrence in this region are not uncommon.

The cause of the disease is an animal parasite called the *Acarus scabiei*, or *Sarcoptes hominis*. The young or larval acarus has only six legs, four in front and two behind; while the full-grown insect has eight limbs—four hind legs as well as four in front. The acarus can just be distinguished with the naked eye: a one-inch object glass shows it well. The female is considerably larger than the male; and they copulate upon the skin. After impregnation the female burrows beneath the epidermis, forming fur-

rows or cuniculi, in which her very small eggs are usually deposited at the rate of one a day. Her life has a duration of about three months. The males do not make these galleries, but wander over the surface of the epidermis. The furrow produced by the female can be recognized as a faint white streak, leading from the papule or vesicle.

Sulphur effects a cure by destroying the acarus. Hence, after thoroughly washing the affected parts with hot water and soft soap, the sulphur ointment is to be freely applied. In private practice a soothing but efficacious liniment of equal parts of prepared storax and almond oil may be advantageously substituted for the sulphur ointment. Where this loathsome disease is extensive, sulphur baths (F. 125) prove useful. The patient had better sleep without a shirt between sheets well dusted with the flowers of sulphur (sulphur sublimatum). The contaminated clothes should generally be destroyed; or if it is desirable to keep them they must be purified by exposure to a temperature above 180° Fahr. (this can be done by putting them into hot water, or into an oven, or simply by ironing them with a hot iron), or they may be well fumigated with sulphurous acid gas. This gas can readily be procured by igniting a rag dipped in melted sulphur.

At the Hôpital St. Louis in Paris, the treatment is this: the patient immediately after admission, is thoroughly scrubbed with common soap from head to foot, for thirty minutes. He then has a warm bath, in which he remains for an hour; during which time he is again scrubbed. On quitting the bath he is well rubbed for half an hour with an ointment composed of—three ounces of carbonate of potash, dissolved in three ounces of distilled water; sublimed sulphur, six ounces; and lard, twenty-three ounces. These ingredients are thoroughly mixed together. By this means the acari are killed; and thus the patient may be said to be cured in two hours. In fact, a few more simple baths complete the treatment.

An aggravated form of itch known as *Norwegian scabies* (scabies crustosa) has been occasionally observed in different parts of Europe. It is only peculiar in its great severity; and in its presenting large scaly crusts, which are composed of epithelial cells, acari and their eggs and excrement, sebaceous matter and lymph. The parasite is identical with that commonly met with.

PART XIV.

DISEASES OF THE APPENDAGES OF THE SKIN, ETC.

I. DISEASES OF THE HAIR.

THE diseases of the hair which are due to the presence of a parasitic fungus having been already described, it only remains to notice those that arise from general causes. Like other structures, these horny appendages of the skin are affected by the health of the bearer; marked examples of which influence are seen in the production of gray hair from mental anxiety, premature decay, and old age. Numerous diseases also (such as fever, syphilis, phthisis, &c.) produce loss of hair, owing to their interference with the nutrition of the hair-bulbs and of the tissues in their immediate neighborhood. The use of hair dyes often proves very prejudicial; for if they contain nitrate of silver they irritate the scalp and injure the hair-follicles, while those made with oxide of lead may possibly give rise to severe colic. Many cases are known where the hair has become quite gray from the effect of depressing circumstances; and yet, when these circumstances have improved, this appendage as it has grown has been developed of the color natural to the individual.

Every single hair may be supposed to have a life of its own, and hence to pass through the three stages of growth, maturity, and decay. Each one, likewise, seems liable to disease and premature death. But our philosophy fails to teach us why the hairs of certain regions are so much more prone to early decay than those of other parts. Why, for example, should we so frequently find a man of forty with a bald scalp independently of any local disease, while the vigor of the hairs upon his chin, eyebrows, and pubes remains uninterfered with? If this change be due, as some assert, to a diminution of the subcutaneous fat, why are not women affected more frequently? But, in fact, many men are bald whose scalps appear thick, and where the adipose tissue is present in proper quantity. Moreover, it is difficult to give any satisfactory explanation of the fact that in some regions more than others the fall of the hair is attended with destruction of the follicles. When an eyelash dies and is thrown off, the follicle soon produces a successor; but this is not as constantly the case with regard to the hairs of the scalp. It is, however, very difficult to say from the appearance of a part whether the hair-follicles and bulbs have been destroyed or not. No greater degree of baldness can be shown than is present in cases of tinea decalvans, the affected spots being perfectly white and smooth and

polished. Yet by proper treatment the follicles can be stimulated so as to produce a new crop of healthy hair. And even in the baldness of old age, when the follicles and bulbs are obliterated, it is possible that a new set may be developed. "We are aware," says Dr. Graves, "that the least highly organized tissues are capable of being reproduced after having been destroyed; now many facts have come under my notice which seem to authorize the conclusion, that when the original stock of bulbs has been destroyed in the scalp, a new stock is frequently developed by the powers of nature, and thus an entirely new crop of hair arises."* As affording presumptive evidence of the soundness of this view, Dr. Graves cites the histories of several individuals who, at an advanced age, have had their failing sight completely restored; while he mentions the cases of others, in whom, after the threescore years and ten have been attained, a new set of teeth has been cut.

Loss of hair, or *baldness*, or *alopecia* [from *Ἀλώπηξ* = a fox—because this animal is said to be liable to baldness], may be partial or general; while it can occur at any period of life, may be temporary or permanent, and is much more commonly observed in the male than in the female sex. In a few rare instances there has been a congenital absence of hair, owing to some imperfect development of the apparatus which secretes this appendage. Senile calvities [*Calvus* = bald] usually takes place gradually, the hair first becoming thin about the crown, or on the temples and forehead. It is a consequence of the general loss of power, the hair-follicles, like most of the other organs, participating in the general weakening of the nutritive functions; while as the follicular apparatus is destroyed, the loss generally proves irremediable. But in the baldness which occurs from debility, hemorrhages, fevers and other acute diseases, tuberculosis, syphilis, &c., the organs which secrete the hair usually remain entire though inactive; and then by giving tone, locally and generally, a cure may ofttimes be effected. The remedies therefore must consist of such agents as will aid the digestion of nourishing food, as well as of steel and quinine and cod-liver oil; while stimulants are to be used locally to excite the capillary circulation through the scalp. Amongst the latter agents may be mentioned brushing, kneading, and friction of the scalp; the occasional application of the liniment of cantharides, diluted in proportion to the effect which it is desirable to produce; with the use of embrocations which irritate without blistering (F. 287). An ointment of iodide of sulphur, or of creasote, or of iodine, or of Peruvian balsam, will also be found useful. In addition, the hairs which have not fallen ought to be cut short, those especially which appear withered and split being clipped close to the skin; while the scalp is to be well brushed, care being taken not to injure the new downy hairs (*lanugo*).

Hirsuties [from *Hirsutus* = hairy], or *an augmented growth of hair*, is sometimes observed in association with constitutional debility. The hair of the head is often very long, and the eyelashes thick, in strumous and phthisical subjects. Hair, in small quantity, may also be developed about unusual situations (local hypertrichosis), as on the surface of the mucous membrane of the mouth, intestinal canal, bladder, vagina, &c. Women advanced in life, especially perhaps if they have never borne children, frequently have hair developed on the chin and upper lip. Moles, mother's

* Studies in Physiology and Medicine, by the late Robert James Graves, F.R.S., p. 338. London, 1863.

marks, or nævi pilosi [*Pilus* = a hair] consist of dark-colored patches covered with hair. They are formed by irregular deposits of pigment, with enlargement of the hair-follicles and bulbs; the capillary vessels being normal instead of increased in number and size as in vascular nævi. Pilous nævi are often about the size of a sixpence, but occasionally they are seen of much greater extent. In a case mentioned by Alibert, the skin of nearly the whole body was studded with black moles, which were covered with dark and thick woolly hair.

Every now and then cases are seen where there is an abnormal superabundance of hair over the whole body (universal hypertrichosis). Julia Pastrana, who was to be seen in London a few years since, not only had a fine beard, but her whole body was extraordinarily hairy, while her little son seemed about to have as much hair as his mother. Many similar cases have been described and figured by Dr. Beigel in his interesting little work on the structure and diseases of the hair.

A loss of the color of the hair, or *canities* [*Canus* = gray hair], may depend upon disease or on advanced age, while it will also now and then arise from deep mental emotion. In a few instances partial canities is congenital, one or more patches of the whitest hair being found surrounded by locks of a dark color. In the Albino the whole of the hair seems deprived of coloring matter. Bichat has particularly noticed the influence of the different passions of the mind upon the internal structure of the hair, its color being often changed by grief in a short period; and he speaks from personal knowledge, of five or six examples in which the loss of color was complete in less than eight days, while in one instance the hair became almost entirely blanched in a single night. The cases of Marie Antoinette, Mary Queen of Scots, Sir Thomas More, &c., are well known to students. In senile canities the grayness occurs gradually, white hairs being found amongst those of the ordinary color; the number of the former steadily increasing until the latter have been quite supplanted. This change often commences in men shortly after the age of forty.

The hair will sometimes grow in a wrong direction. Thus, the points of five or six eyelashes (especially those of the upper lid) may project on to the surface of the eyeball, giving rise to very considerable irritation and annoyance. *Trichiasis* [from θρὶξ, τριχὸς = the hair] is to be cured by slowly and steadily removing each eyelash with broad-pointed and well-grooved forceps, and then dabbing the part frequently with spirits of wine to destroy the follicle. In *distichiasis* [Δὶς = double + στίχος = a row] the tarsus has a supernumerary row of cilia, the points of which irritate the conjunctiva and cornea, as in trichiasis.

A peculiar disease of the hair known as *Plica Polonica* [from *Plico* = to twine together], or *Trichonosis plica* [from θρὶξ = the hair + νόσος = disease], or *Polish Ringworm*, is endemic in Poland and in some parts of Russia and Tartary. It is characterized by considerable tenderness and inflammation of the scalp; the hairs become swollen and imperfectly formed; while the hair-follicles secrete a large quantity of viscid reddish-colored fluid, which glues the hairs together and unites them into tufts or felt-like masses. When the disease is of long standing, two cryptogamic plants (the Tricophyton tonsurans and Tricophyton sporuloides) have been detected by a minute examination. Sometimes the matted hairs are loaded with pediculi. This Polish disease is not confined to the scalp, but appears apt to involve the hairs on any part of the integument. The odor from the affected parts is said to be most disgusting.

II. DISEASES OF THE NAILS.

The nails may be described as horny shields, originating in a fold of the cutis vera, and so placed as to protect the ends of the fingers and toes. In very rare cases there is a congenital absence of one or more of these appendages, while seldom we find supernumerary nails, or a nail is developed in an unusual situation—as on the stump of an amputated finger. Occasionally these organs are shed with some degree of regularity, a new one being formed which gradually loosens and throws off the old structure placed above it. The nail may be also cast off in consequence of a whitlow when the inflammation has commenced near the matrix. As the growth of the nails, both in length and thickness, is regulated by the rate of general nutrition, so during sickness their development is retarded. This point of retardation is generally shown by one or more transverse furrows, owing to the part secreted during illness being thinner than that formed in health; and hence it has been said that the nail presents a sort of register of the state of nutrition during its existence. The furrow is usually most distinct on the thumb nail, and is sometimes even confined to this part. I think, also, I have seen it more marked on the left than on the right hand; although this may have been an accidental occurrence. A curving of the nails, with clubbing of the last phalanges, has been sometimes observed in phthisis, cyanosis, &c. The thumb nail probably takes about twenty weeks in growing from its root to the free margin.

Ingrowing of the nail, or *onyxis* [from *Ὄνυξ* = a nail or hoof], is a painful condition which not unfrequently occurs on the outer part of the great toes, and which is usually produced by ill-fitting boots. The side of the nail is pressed into the flesh at its margin; the pressure and irritation being increased by walking, so that inflammation and ulceration are soon set up. The ulcer becomes covered with flabby and sensitive granulations, and there is an unhealthy discharge. A cure may often be effected by removing the pressure; by rest, with the leg elevated; and by scraping the side of the nail very thin, softening it by soaking in warm water, and then separating it from the sore with a little pellet of cotton-wool carefully inserted under the edge. Where this treatment fails, as it will when the case has been neglected and the fungus granulations are prominent, the offending half of the nail had better be removed. As this operation is very painful, congelation must be employed or the patient should be placed under the influence of chloroform. The blade of a pair of strong sharp-pointed scissors is thrust up under the nail to the matrix, the nail is divided, and the strip is drawn out with the forceps. The subsequent use of water-dressing, or of the common red lotion (F. 264) if the granulations are indolent, will quickly heal the sore.

Disease of the matrix, or *onychia* [from *Ὄνυξ* = a nail], consists of a tedious ulceration about the root of the nail. It may arise, as it not very unfrequently does in children, from a depraved state of the constitution; or it is sometimes caused by a mechanical injury—especially by a severe crush or bruise. There is pain and swelling at the root of the nail, and about the surrounding skin; on pressure, a sanious discharge exudes at the sides; the nail gets raised, is turned upwards, and finally becomes detached so as to expose a foul ulcer; while this ulcer looks glazed and irritable, and often shows a tendency to extend in all directions. Occasionally, the distal phalanx becomes necrosed. When the disease is severe it is

often improperly spoken of as *onychia maligna.* In some cases of syphilis a peculiar discoloration and crumbling of the nails is observed, with or without ulceration about their roots; the appearance being similar in kind but less pronounced than those seen in psoriasis. Supposing that the nail is merely loose it ought to be removed, so as to allow of the ulcerated surface being dressed with black wash or red lotion. The patient must be fed well and should take cod-liver oil. In obstinate cases a mixture of arsenic and chlorate of potash and steel (F. 402) will prove very serviceable. In onychia associated with constitutional syphilis, local fumigation with calomel is deserving of trial; while the red iodide of mercury (F. 54) may be administered internally.

A peculiar condition termed *psoriasis of the nails* has been met with every now and then. In many instances it appears to be the consequence of an old syphilitic taint. The nails first become discolored, thickened, and rough; then they get raised and assume the appearance of a coarse scab; while at last they crack, and crumble away, and separate at their roots, leaving an unhealthy fissure. Arsenic (F. 52) is the only remedy which exerts any influence upon this chronic affection. Where there is a history of syphilis, Donovan's triple solution (F. 51) should be employed. Local remedies are usually of little service. The application of a mixture of equal parts of the calomel and creasote ointments might perhaps assist the cure.

Favus of the nails [technically known by the uncouth term "onychomycosis," from ὄνυξ = a nail + μύκης = a fungus] is a disease which once in a way attacks individuals affected with tinea favosa. The irritation of the scalp causes the sufferer to scratch it; and thus the parasitic fungus (the Achorion Schönleinii) gets transferred beneath the nail, where it finds a fitting soil for developing roots and germinating. As the yellow favus material increases, so the nail gradually increases in thickness; ultimately becoming perforated by the fungus. When such perforation has occurred a cure can be effected by the free use of a corrosive sublimate lotion. Where, however, the case is seen prior to this occurrence, the most projecting part of the nail should be scraped with a piece of glass so as to form an opening through which the parasiticide lotion can soak.

Where the nail has been cracked or injured prior to the parasite getting attached to it, the tubes and spores of the fungus may penetrate the structure of the nail through this injured part, and so become developed until they reach the root. The nail may then loosen and be thrown off; or it will split up and cast off thickened layers of unhealthy structure.

Produced like favus unguium, we sometimes meet with another variety of parasitic onychia, viz., *ringworm of the nails;* in which these structures are rendered brittle and apt to split longitudinally. The parasite (the Tricophyton tonsurans) must be exterminated as in the preceding instance.

Hypertrophy of the nails can scarcely be called a disease. It is often met with in bedridden persons, as the consequence of neglect. The nail of the great toe may thus attain an extravagant length and thickness; while by curving inwards, and pressing into the flesh of the foot, it will produce much pain and inconvenience. A nail altered in this manner can usually be easily removed. It is only necessary to grasp it firmly with the ordinary dressing forceps, and then with a little tact evulsion will quickly be accomplished.

III. WARTS, CORNS, AND HORNS.

Warts or *vegetations*, or *verrucæ* [from *Verruca* = a wart], consist of collections of hypertrophied cutaneous papillæ; each papilla being separate and merely covered with thin cuticle, or a bundle of papillæ being bound together by an excess of dry and hard scaly epithelium. Both varieties are equally common. Warts may occur singly or in groups; they are especially frequent in children and young people; the hands and fingers are their most common seats, though they may be met with on the scalp and on the face and on other parts of the body (see p. 266); and they may be caused by anything which irritates the skin, particularly if there be any hereditary tendency to them. The warty growths which form upon the face in elderly people, those which are produced by soot on the scrotum of chimney-sweeps, and those which rarely occur on old cicatrices, are forms of epithelial cancer. The secretion from simple warts is probably non-contagious; while there is no reason for believing in the popular theory that the blood from a wart will produce a similar growth wherever it is applied. Attention to cleanliness and the employment of some caustic, will generally cure the common warts. Nitrate of silver, glacial acetic acid, the acid solution of nitrate of mercury, may be applied on two or three occasions; or the growth can easily be snipped off with a pair of curved scissors, and the wound dressed for a day or two with any simple astringent lotion.

The hypertrophied and condensed masses of epidermis which are known as *corns* are produced upon prominent parts of the body by pressure. Thus they are most frequently met with on the toes owing to the irritation of badly made boots, or on the soles of the feet; while they also occasionally form on the elbows and knees, or on the extremities of the fingers in those who play upon stringed instruments. Some corns are more painful than others; the annoyance and suffering being often considerable when the callosity is seated on the projection of a deformed toe. Where there is acute bending of the phalanges from extreme contraction of the flexor tendon, a prominent site is offered on which a corn frequently grows; and I have known so much suffering thus produced that the patient has willingly submitted to amputation of the toe, after finding that the subcutaneous division of the tendon has been useless. The pain arises not so much from the pressure of the hardened epidermis, as from the prolongation of one or more of its fibres (commonly known as the roots) into the true skin.

Soft corns are formed between the toes, and more frequently on the outer side of the fourth than on any other toe. They are kept soft or spongy by the warm exhalations from the sweat glands of the adjoining tissues. Occasionally, an irritable wart is mistaken for a soft corn.

Corns can only be cured by the removal of the pressure which produces them. The boots or shoes must be made with thin upper leathers (particularly avoiding patent-leather), and so shaped as to fit the foot properly. The socks ought also to be fine and light, and not unnecessarily loose. Then the sufferer must regularly attend to his feet, carefully cutting each corn with a sharp knife about every fourteen days; it being better to soak the feet in warm water for some fifteen minutes previously, than to try and shave away the hard tissue. In some cases a small piece of amadou plaster, with a hole punched out of its centre, may be applied with advantage. Should suppuration take place beneath a corn the foot ought to be well bathed, and the pus early let out by a small puncture.

A *bunion* consists of an enlargement and a thickening of a bursa,—generally of that one situated over the metatarsal joint of the great toe. It may be, but not necessarily, accompanied by distortion of the articulation. Occasionally the bursa suppurates, a fistulous opening being very commonly left after the evacuation of the pus. A very painful bunion is sometimes formed over the instep, on the scaphoid bone; but it is less frequently met with than it used to be when men punished themselves with tightly-fitting Wellington boots. The only remedy for an ordinary bunion is a boot made so large, that the toes are not crowded together in a bunch. In bad cases, the use of buckskin, or of the material known as "pannus corium," is preferable to common leather.

Horns are made up of condensed and dried layers of epithelium, with or without a core composed of greatly hypertrophied papillæ. Their bases are freely supplied with blood. As they increase in size by the continual formation of new layers of epithelium, a tendency to become curved or spiral is usually manifested; so that they may assume the appearance presented by the small horns of the ram. These structures are but seldom met with in the human subject. They are more apt to grow from the scalp than from other districts; although occasionally they are seated on the face or trunk. Frequently, a horn can be cleanly separated from its attachment to the skin by a gentle wrench, but where there are firm papillary prolongations into the growth, it may be necessary to make a couple of oval incisions. If the horn arise from the interior of a sebaceous cyst, as it may do on the scalp, the sac should be cleanly dissected out.

IV. PHTHIRIASIS.

Phthiriasis [from $\Phi\theta\epsilon\acute{\iota}\rho$ = a louse], or lousiness, may be described as that condition in which lice become developed on the surface of the body; a fitting soil being supplied by filth, by the morbid secretions in cutaneous affections, as well as by constitutional disease. The human body may be infested with three kinds of lice, viz., the *Pediculus corporis* vel *P. vestimentorum*, the *P. capitis*, and the *P. pubis*. All are oviparous, the eggs being known as *nits;* the sexes are distinct; while the young are hatched in five or six days, and in eighteen days are capable of reproduction.

The *body* or *clothes-louse* is of a dirty-white color, and from one to two lines in length. Its head is irregularly oval, with two antennæ, and prominent eyes; the abdomen is thrice as broad as the thorax; and from the latter three legs are developed on each side. This louse seems to live in the clothing, attacking the skin for its nourishment. The irritation which it produces is very great, while the scratching resorted to for relief gives rise to a pruriginous rash. The *head* or *common louse* is smaller than the preceding, and is never found anywhere but on the scalp, where it multiplies abundantly. Its body is flattened and rather transparent; it is of a gray color, or of a red hue when full of food; and its thorax, one-fourth the length of the abdomen, has three limbs on each side. The *pubic* or *crab-louse* attaches itself especially to the hairs about the sexual organs; but it is also found on those of the axillæ, and even on the eyebrows. As far as is known, it never invades the head or beard. It resembles the other lice save that its body is large and flat, without any defined separation

between the thorax and abdomen. It clings to the roots of the hairs, and deposits its nits on these structures.

In some very rare instances there appears to be a constitutional condition favoring the development of pediculi, or at all events of the soil which is congenial to them; so that the statements of old authors "that divers persons have come to their ends, being devoured by lice," are not so very improbable. Dr. Whitehead relates an instance, which I shall here abbreviate, in confirmation of this statement:* R. S. æt. forty-three, a farmer, strong, of sanguine complexion, contracted a virulent form of syphilis in April, 1840, for which he was chiefly treated with ioduretted sarsaparilla. Seven months afterwards he suffered severely from secondary symptoms; when he was placed on a course of mercurial medicine and became salivated, with great relief to his disease. At the end of 1841 he again sought advice, stating that for several weeks past he had been annoyed by the presence of lice about his person, chiefly on the trunk. He was scrupulously clean in his habits, and had never before been troubled in a similar way. No lice were found about the head; what little hair he had was clean, fine, and silky. The vermin so increased in number, and produced such mental distress, that fears began to be entertained for the integrity of his intellect. On examining his skin, a multitude of irritable-looking points were detected on the front and sides of the chest from which the nits could be detached by lateral pressure. At this period the generation of the insects got so considerable, that the flannel vest put on clean in the morning was crowded with them by the end of twenty-four hours. For some time remedies were unavailing; sulphur, oxymuriate of mercury, white precipitate, and hellebore, were freely tried with little or only temporary benefit. At length, by mere chance, a mixture of iodide of potassium and prussic acid in full doses was given; and in a few days, after taking sixteen or eighteen draughts, the cure was permanently completed. Dr. Whitehead has also favored me with the account of another case in which the quick generation of the body louse was remarkable. The patient was a young lady, a member of a highly respectable family, in whose skin, mostly below the margin of the mammæ, the nit was formed in a small pimple, which gave exit to its contents like a pustule in acne. She had been troubled with these lice for several years. Mr. Bryant has reported a somewhat similar case: A patient who had been a governess, and who was 30 years of age, was admitted into Guy's Hospital. The whole of her body was literally covered with lice; the irritation and scratching having given rise to excoriations and scabs. She was put into a warm bath, and all her clothes were taken away. Every precaution was adopted to remove all the insects, but two hours afterwards her body was again covered with them, although she lay in a clean bed. She was again thoroughly washed, but the vermin reappeared immediately. All the remedies employed proved useless.† Bernard Valentin has also related the history of a man who suffered from intolerable itching on all parts of his body, while his skin was covered with tubercles. On incising these, each was found filled with lice. Bremser once met with a mass of lice in a tumor on the head. And Jules Cloquet observed some thousand of these insects in a subcutaneous cavity.‡ According to Erasmus Wilson, the explanation of these cases is simple; for he says that the pe-

* On the Transmission from Parent to Offspring of some forms of Disease, and of Morbid Taints and Tendencies. Second edition, p. 173. London, 1857.

† Quoted from the Parasitic Affections of the Skin, by T. McCall Anderson, M.D., p. 108 London, 1861.

‡ Moquin-Tandon's Elements of Medical Zoology, translated by Robert T. Hulme, F.L.S., p. 295. London, 1861.

diculi creep from the outside of the skin into follicular tumors, where they feed on the contents and are afterwards found as the sole occupants of these sacs. From their organization it is clear that pediculi are air-breathing animals; and that consequently they cannot exist under the skin where respiration would be impossible.*

The presence of lice is easily determined by a careful examination. The irritation produced by these disgusting insects can scarcely be mistaken for that caused by the common Flea (*Pulex hominis*, vel *P. irritans*), the bite of which is seen as a dark speck in the centre of an erythematous spot; or for that produced by the Chigoe, or Jigger, or Sand flea (*Pulex penetrans*), which is so annoying to the residents of Guiana and Brazil; or for that originated by the Harvest Bug (*Leptus autumnalis*, vel *Acarus autumnalis*); or for that developed by the stinking Common Bug (*Cimex lectularius*), the bite of which causes a hot and tumid spot, having a whitish central point; or for that set up by the Mosquitos and Common Gnats (*Culex pipiens*), the bites of which are so intolerable in warm countries, as well as in Lapland.

The pimple mite (*Steatozoon folliculorum*) rarely gives rise to any itching or discomfort. This species of acarus has a worm-like form, and a length varying from the fiftieth to the hundredth part of an inch; it inhabits the ducts of the sebaceous glands, and especially those about the alæ of the nose; while it is probably to be found in the great majority of persons, only becoming troublesome by excessive increase. In such a case, these parasites may be destroyed by rubbing in calomel, or by washing the affected part with a weak solution of corrosive sublimate.

To remove lice, free washing with common yellow or with soft (potash) soap and hot water must first be employed. There are also sulphur soaps and carbolic acid soaps, either of which can be used, if thought desirable. Where the body louse is present, the clothing ought either to be destroyed, or exposed to a temperature of 180° F., or well fumigated with sulphur. Then these insects are generally destroyed, without difficulty, by sulphur fume or water-baths; or by the application of the glycerin of carbolic acid, or of mercurial ointment, or by the mercurial vapor-bath, or by free dusting with calomel, or by the use of a lotion of corrosive sublimate (two grains to each ounce of water), or by free inunction with the cocculus ointment. This ointment, which was withdrawn from the second British Pharmacopœia, is made with eighty grains of the seeds of Cocculus Indicus to one ounce of prepared lard. The nits, if not killed by these remedies, may be readily combed away, after washing the hairs thoroughly with vinegar, or with spirits of wine.

V. TRICHINIASIS.

Trichina disease, or Trichiniasis [from θρίξ, τριχός = a hair] is a peculiar febrile helminthic affection, somewhat resembling typhoid fever in its general symptoms. Dr. F. A. Zenker, in the year 1860, first proved the existence of this disease (in the case of a girl who died at Dresden) and showed that it was due to trichinal infection.

The small nematode worm which has attracted so much attention since

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* On Diseases of the Skin: a System of Cutaneous Medicine. Sixth edition, p. 829. London, 1867.

the publication of the striking observations of Dr. Zenker was discovered by Professor Owen, in the year 1835, in a portion of the muscles of a male subject sent to him by Mr. Wormald. A peculiar speckled appearance of the voluntary muscles had attracted the attention of this gentleman; and these specks were found by Mr. Owen—as Tiedemann and Mr. John Hilton had previously shown to be the case in similar instances—to consist of minute encysted entozoa. For this parasite, Mr. Owen proposed the name of *Trichina spiralis*, owing to its hair-like and spirally coiled form. Since this period, it has been frequently discovered in the dissecting-room by German and English anatomists; although, prior to 1860, it was regarded as an interesting curiosity, rather than as the cause of a serious disease. If a muscle infested by trichinæ be examined, it will generally be found to present a peppered appearance owing to the presence of small and grayish-white gritty granules. These specks or granules are the round or oval, and more or less calcified, cysts. They contain the immature worm, or worms; and each capsule generally measures the $\frac{1}{50}$ of an inch in its longitudinal direction, and the $\frac{1}{100}$ of an inch in the transverse diameter. The young trichina, when extracted from the cyst, is usually disposed in two, or in two and a half, coils; while on being straightened out it is found to be about the $\frac{1}{30}$ of an inch in length, and the $\frac{1}{700}$ of an inch in diameter (Owen). Trichinæ may, however, exist abundantly in muscular tissue, though only to be recognized by means of the microscope, without any cysts or capsules being present; the latter being only abnormal formations, according to Leuckart. The fully developed and sexually mature male trichina measures the $\frac{1}{18}$, and the adult female the $\frac{1}{8}$ of an inch (Cobbold); the increased size of the latter being due to the great development of the ovaries and oviducts.

An excellent account of the trichina was published by Leuckart, at Heidelberg. in 1860; and though some of his conclusions have been disputed by subsequent observers, yet generally they are believed to be correct. He sums up the results of his labors in sixteen propositions, which are as follows:

(1.) The trichina spiralis is the juvenile condition of a small nematode worm hitherto unknown, to which the genus name "trichina" has also to be given. (2.) The sexually developed trichina inhabits the intestinal canal of numerous warm-blooded animals, particularly of mammals, and of man, and always in great numbers. (3.) Already, on the second day after immigration, does the intestinal trichina attain its full sexual maturity. (4.) The eggs of the female trichina are developed in the uterus of the mother into filaria-like very minute embryos; which, beginning from the sixth day, are born without any covering derived from the egg. (5.) The newly born trichinæ soon commence a migration. They penetrate the walls of the intestines, and pass through the abdominal cavity directly into the muscles of the animal in which they are bred, where they are developed into the well-known form, provided the conditions are favorable. (6.) The direction in which they move is marked out by the intermuscular cellular tissue. (7.) The majority of embryos remain in the group of muscles surrounding the abdominal cavity, particularly the small muscles with much connective tissue. (8.) The embryos pierce into the interior of the single primitive muscular fibres, and here they attain within a fortnight the size and organization of the well-known trichina spiralis. (9.) The infected muscular fibre loses its original structure soon after the entrance of the parasite. The fibrillæ are transformed into a finely granular matter, while the nuclei of the sarcolemma are metamorphosed into oval nucleated cells. (10.) The infected muscular fibre retains its original

shape until the young trichina is fully developed, while afterwards its sarcolemma is thickened and contracts from both ends towards the middle. (11.) The spot inhabited by the coiled-up parasite is converted into a spindle-shaped dilatation, round which the sarcolemma is thickened and hardened by the disposition of calcareous particles, producing the lemon-, egg-, or ball-shaped cyst. (12.) The migration and development of embryos are also effected by the transfer of pregnant trichinæ into the intestine of a new suitable animal. (13.) The development of muscular trichinæ into sexually ripe animals is quite independent of the presence or absence of the calcareous membrane, and begins whenever the former are fully developed. (14.) Male and female individuals can already be distinguished in the juvenile state. (15.) The immigration of great numbers of young trichinæ causes a very dangerous, and, under certain circumstances, fatal disease. (16.) The mere eating of trichinous flesh may (without immigration of young trichinæ) cause more or less dangerous or even fatal conditions.

The *symptoms* of trichiniasis vary in degree, being mild or severe according as only a few or many of the worms have been swallowed, as well as in proportion to the number of the progeny and the extent of their migrations. Thus, Dr. Althaus remarks that in the epidemic of Burg, near Magdeburg, a woman who had eaten a quantity of raw pork with bread, fell ill and died: her child, who had sucked a spoon used by the mother, suffered slightly and recovered. According to the accounts given by most authors, the earliest symptoms are loss of appetite and general malaise; to which succeed nausea and retching, prostration, diarrhœa, a sense of thorough indisposition, and a painful stiffness about the neck, and arms, and legs. This pain is due to the immigration of the young trichinæ into the muscles; and it is accompanied with high fever, and an œdematous swelling about the eyelids and face. The pulse is frequent, and there are copious offensive perspirations; but although the temperature of the body is raised it does not reach the same height as in typhus and typhoid fever. For some days the stiffness of the limbs continues to increase; while all the muscles seem to be painful and swollen and very sensitive to the touch. The movements of the intercostal muscles in respiration, are attended with suffering, so that repose is impossible; while there will be troublesome hiccup if the diaphragm be invaded, with hoarseness and loss of voice where the laryngeal muscles get inhabited. Neuralgia of a very severe description, in the cœliac and mesenteric plexuses, has likewise been present in certain cases. When a large quantity of trichinous meat has been eaten, so that the immigration of the trichinæ into the muscles is great, the patient may lie almost paralyzed in a state of great exhaustion. The facial œdema generally lasts about a week, its disappearance being followed by swelling of the feet and legs, and ultimately of the trunk. There is no effusion, however, into any of the cavities; nor does the urine become albuminous, although it is always lessened in quantity and may be loaded with urates. About the beginning of the fourth week the patient is in a pitiable condition. The pulse and respirations are very frequent, the tongue is red and dry, the pain is severe, the sweating is profuse, the mouth can scarcely be opened, no sleep can be obtained, and there is great anxiety or delirium; death not unfrequently occurring with all the symptoms of profound exhaustion. Such complications as pneumonia, peritonitis, and pleurisy with effusion, are not uncommon. In favorable cases, however, the pain, and swelling, and diarrhœa abate; the oppression of the chest passes off; sleep is obtained; a desire for nourishing food is evinced; the power of the limbs is regained; and there is only left great anæmia, with a falling

off of the hair, &c. The parasites have taken up their abode in the muscles, and have fortunately become encysted.

The *diagnosis* of trichiniasis is not difficult, especially if the symptoms come on shortly after very underdone or raw pork, ham, or sausages, have been eaten. In the early stages, the trichinæ may be discovered in the stools; but the necessary microscopic examination will often occupy some hours. Subsequently, the worms can be found by taking out a small piece of an affected muscle and minutely examining it. In this way, the fact that the disease has been present may be ascertained long after recovery. Dr. Althaus quotes from Dr. Griepenkerl the following confirmation of this opinion: From 1859 to 1862, an epidemic occurred in Blankenburg, in the Duchy of Brunswick, which was believed to be of the nature of gastro-rheumatic fever. Some time afterwards, when attention had been directed to the occurrence of trichina disease in other parts of Germany, the similarity of the latter distemper and the epidemic just mentioned, struck the doctors of Blankenburg; and a gentleman who had fallen ill there in 1859, but had recovered after a protracted illness, was informed that he had probably suffered from trichiniasis. He therefore offered to have a small piece of muscle cut out, and the specimen being examined by the microscope revealed no less than seven encysted trichinæ. It was thus shown that the Blankenburg epidemic, in which no less than 278 soldiers and a corresponding number of civilians had been attacked, was in fact the flesh-worm disease.

The results of *treatment* have not been very satisfactory. The cases are not seen in the earliest stage, when emetics and purgatives would do much good; these remedies, however, being comparatively useless after the fourth day from that on which the trichinous food has been consumed. Nevertheless, if diarrhœa and vomiting be absent during the first two or three weeks, it will be advisable to produce purging by full doses of calomel, so as to remove any intestinal trichinæ which may remain. Moreover, where there is diarrhœa, it seems unadvisable to attempt to check it. The sleeplessness and copious sweats were found by Dr. Rupprecht to be best relieved by the wet-sheet packing; the different preparations of opium proving injurious. With regard to any special remedies for destroying the muscular trichinæ, nothing satisfactory is known. The picronitrate of potash and benzole are those agents which seem to be the most promising, but further experiments are needed before they can be recommended. The sulphocarbolate of soda might possibly prove useful.*

* The reader who wishes to investigate this subject more fully should study Professor Owen's "Description of a Microscopic Entozoon infesting the Muscles of the Human Body,"—Transactions of the Zoological Society of London, vol. i, p. 315 (1835); Professor Owen's essay on the Entozoa,—Cyclopædia of Anatomy and Physiology, vol. ii, p. 111; Dr. Cobbold's treatise,—Entozoa; an introduction to the Study of Helminthology, p. 334; a pamphlet by Dr. Althaus,—On Trichinosis, or Flesh-worm Disease; the work of Dr. W. Abbotts Smith,—On Human Entozoa, p. 201; Dr. Lankester's translation of Küchenmeister, on Animal and Vegetable Parasites of the Human Body, vol. i, p. 333; and the admirable report by Dr. J L. W. Thudichum on the Parasitic Diseases of Quadrupeds used for Food, in the Seventh Report of the Medical Officer of the Privy Council (1864), p. 348.

In the above section, the severe mischief which an animal parasite can set up is shown. The extensive destruction which may result from the propagation of the lowest form of vegetable life (the *Fungi Cryptogamia*) is well seen in the case of the *Fungus Foot of India*. The mucedinous fungus (named by the Rev. Mr. Berkeley as the *Chionyphe Carteri*) in this affection eats its way into the metatarsal and tarsal bones, and ultimately into the extremities of the tibia and fibula to just above the ankle; producing numerous fistulous channels, which become filled with rounded black masses of fungus. The disease has been named *Mycetoma* [from Μύκης, ητος = the Mushroom] by Dr. H. V. Carter, of Bombay. It has only been observed in

VI. DRACONTIASIS.

Dracontiasis [from *Δράκων* = a serpent] may be described as a singular helminthic disease, produced in the human body by the presence of the Guinea-worm.

The Dracunculus medinensis, Filaria medinensis, or Guinea-worm, has a slender cylindrical body; which is sometimes nearly as thick as a crow-quill, and which varies in length from one to ten or twelve feet. The worm is endemic in some parts of Asia and Africa, especially in marshy districts; while persons returning from these countries occasionally bring this nematode helminth back with them. According to Küchenmeister it is probable, that the "fiery serpents" which "bit the people, and much people of Israel died," were dracunculi; and if so, then Moses is the first writer who has referred to these worms. At all events, it is impossible to doubt that Plutarch describes the dracunculus in the eighth book of his "Symposiacon," where he makes Agatharchides of Cnidos, who probably wrote about B. C. 140, narrate "that the people taken ill on the Red Sea suffered from many strange and unheard-of attacks; amongst others, worms, like little snakes, came out upon them, which gnawed away their legs and arms, and when touched again retracted themselves, coiled themselves up in the muscles, and there gave rise to the most insupportable pains." The dracunculus proves very troublesome in the present day, in certain districts. Thus one or more stations (Matoonga, in Bombay, for example) for our troops in India have had to be abandoned solely on account of the extensive presence of the Guinea-worm in the tanks and wells.

At present we are chiefly familiar with the adult female dracunculus, which reproduces viviparously; the active embryos being found in stagnant pools, in the soil forming the foundations of artificial reservoirs, as well as in damp mould and mud.

The common seat of the Guinea-worm in the human body is the subcutaneous connective tissue, and especially that of the extremities. It has very rarely been found in the tongue, but more frequently in the scrotum. In an analysis of 181 cases by Sir James McGrigor, it appears that the feet and legs were affected in 157. The impregnated worm probably perforates the sweat-ducts of the skin, and thus effects a lodgment. It may give rise to no symptoms for some months; and then the first indication is usually a feeling of irritation in the affected part, where a cord-like ridge can often be felt. There may be also much constitutional disturbance, such as fever, headache, nausea, colic, and debility; though sometimes only local pain is complained of. A kind of boil usually forms, in the centre of which a black point will perhaps be seen; while on the pustule breaking, the head of the worm may protrude. If the latter be injured, a milky fluid may be discharged, which will be found on a microscopic examination to be loaded with minute dracunculi. When the head protrudes, a thread may be placed around it and rolled upon a small stick or piece of bougie; and then day by day the worm is to be gently drawn out, and wound round the stick until the extraction is complete. Where the worm does not protrude, but can be felt as a firm catgut-like swelling under the skin, an incision had better be made so as to expose it; the parasite being at once removed in a

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the natives of India who go about with naked feet; the sporules of the fungus getting introduced beneath the cuticle through some scratch or abrasion, whence they rapidly spread and multiply. Hitherto, amputation has seemed to be the only remedy of any avail.

loop, or being partially lifted up so as to admit of the insertion of a wedge of wood, round which it is to be daily coiled until the whole can be withdrawn without any fracture. According to Dr. Horton, tincture of assafœtida, in doses of thirty drops thrice daily, acts as a poison to this parasite. As such a dose can be taken by the bearer of the worm without any disturbance, no misgivings about the result ought to prevent our giving this drug a fair trial.

With regard to prophylactic measures, all individuals travelling in districts where the Guinea-worm is found should take care to have the feet well covered; to dry the skin thoroughly after bathing or wading through pools, marshes, &c.; and to avoid lying on the damp ground with any part of the body exposed to the soil. In the native country of the worm, English officers suffer very much less frequently than the private soldiers, inasmuch as they do not go about with bare feet and arms.

VII. BURNS AND SCALDS.

The casualties to be considered under this head vary very much as regards their local and constitutional effects, according to the degree and duration of the heat applied, the extent of surface involved, the seat of the mischief, and the strength of the vital powers at the time of the accident. The great depression which follows immediately after the occurrence of an extensive burn will of course be felt more severely by a weak strumous subject, than by one whose constitutional powers have been previously kept up to the standard of health.

The annual mortality from burns and scalds in England is large. During the year 1866, the deaths registered from these causes were $\frac{\text{Males } 1323}{\text{Females } 1210} = 2533$; of which total there were 1327 children under five years of age. These figures are below the average annual deaths for the last eighteen years.

Burns may be conveniently classified into four groups, according as they give rise to simple inflammation of the skin; to inflammation with separation of the cuticle and the production of blisters; to destruction of the papillary layer of derma or cutis; or to disorganization of the entire skin, possibly with injury to the connective tissue and muscles and other soft parts.

(1.) *The burn which produces simple inflammation of the skin* is characterized by redness of the affected part, slight swelling, and severe smarting pains, which last for some hours. It may be caused by the momentary application of hot water, or of steam, or of the rays of a strong fire, or of the flame from a gas explosion. Unless the extent of surface injured be large, the constitutional disturbance in these cases is slight; while the local effects cease in a few days with desquamation of the cuticle. Even in gas explosions, the mischief sustained by the sufferer is chiefly due to the violence with which he is blown down, and not to the action of the flash of flame.

(2.) *Inflammation of the skin with the production of blisters filled with serum* results from a more severe burn. The skin becomes tense and red and swollen; while to relieve these effects there is a spontaneous exudation of serum under the injured part. The vesicles are often large, and the pain is hot and smarting. If the vesicles get broken or rubbed off, the excori-

ated derma becomes exquisitely sensitive. After a scald, the elevated epidermis will often peel off in one piece. Thus, I have seen a child's hand, scalded by a mug of boiling beer being upset over it, throw off the cuticle in one piece, like a glove. With more favorable cases, the epidermis only exfoliates subsequently, and the part is restored to health, without leaving any mark; but not unfrequently suppuration or superficial ulceration takes place, and a cicatrix is left to show the extent of the mischief. The constitutional symptoms are often severe, the shock to the nervous system being especially felt by delicate children.

(3.) *Destruction of the papillary or superficial layer of the derma* cannot always be distinguished from those cases where the whole thickness of the skin is involved. It may, however, at times be recognized by noticing that the cauterized tissue is converted into a grayish or brownish slough; the surface of which, although insensible on being slightly touched, becomes very painful if pressure be made on it. Where the heat has been intense, the part exposed to it has at once become converted into a dry and dark-colored eschar; but where the destroying agent has proved a little less powerful, then an ordinary vesicating gangrenous slough has resulted. Under any circumstances, as the eschar, or the slough, begins to separate from the living tissues, at the end of about four days, severe pain gets established; the only partially destroyed sensitive cutis constituting a very delicate sore surface. The suppuration may be excessive, if the subject have previously been in bad health. After the ulceration has healed, a firm white cicatrix remains as a permanent mark of the accident.

(4.) *Disorganization of the entire skin (possibly with destruction of the subcutaneous connective tissue, muscles, fasciæ, and other soft structures)* takes place when the heat is very great and its application much prolonged. This form is more often produced by the clothes catching fire, or by a fall into a vat of boiling liquid than in any other way. Lunatics will sometimes voluntarily produce such an amount of mischief, while epileptics may involuntarily cause it by tumbling upon the open grate. The pain is most excessive during the application of the burning body, but ceases soon afterwards owing to the destruction of the vitality of the part. A black and hard and dry eschar forms (or a soft eschar in scalds), which at the end of three or four days begins to be detached by suppuration: when perfectly separated, a deep ulcer is left behind. This ulcer gradually heals by granulation; but an indelible cicatrix is formed, which has a great tendency subsequently to contract. Indeed, where the whole thickness of the skin has been destroyed, it seems impossible to prevent subsequent contraction of the cicatrix. When the contraction is excessive, considerable deformity is likely to result. Thus, in burns of the neck, the chin may be drawn down to the sternum and fixed there by the tightening of the cicatrix; in burns involving the pectoral muscles, &c., the arm will perhaps be drawn immovably to the side of the trunk; in burns about the face the most frightful appearances are likely to be caused by the dragging down of the eyelids, lips, &c.

The constitutional symptoms of the last two classes of burns are very important, and of two distinct kinds, viz., primary and secondary. The *primary symptoms* are due to the shock and pain, as well as to that congestion and irritation of the cranial, thoracic, and abdominal viscera which often follow quickly after the accident. The shock to the nervous system from the agonizing sufferings may even destroy life almost at the onset; but where the patient survives this, the pain can (by exciting the heart, brain, and spinal cord), give rise to dangerous congestion of some of the vital organs. In the one case there will be extreme prostration, stupor, or

coma, and coldness of the extremities; in the other, restlessness and excessive excitement, terror or delirium, and a high degree of fever. The *secondary symptoms* accompany the inflammation and suppuration which is set up for the removal of the destroyed tissues. The inflammation, when severe, produces general fever, with symptoms of cerebral or pulmonary congestion; but it is soon followed by exhaustion, which increases the longer the suppurative stage continues. Convulsions or delirium often precede death where there is extreme prostration. Sometimes there is merely complete collapse, from which the patient cannot be roused. If there be considerable cerebral congestion, death will happen during the state of coma.

The stage of depression has a variable duration; dependent partly on the age and constitution of the patient, partly on the amount of mischief. Attacks of sickness, cough, dyspnœa, diarrhœa, jaundice, &c., are not very uncommon.

Reference has already been made to the opinion that a sloughing ulcer sometimes forms in the upper part of the duodenum within a few days after a severe burn, and doubtless in consequence of it (see p. 576). Sometimes this ulcer has rapidly proved fatal by causing hemorrhage, or by setting up an acute attack of general peritonitis in consequence of perforation.

A careful *prognosis* is necessary. In some instances the shock to the system is so great that the patient never rallies, but sinks within twenty-four hours of the accident. With other cases it will perhaps be difficult to persuade the sufferer to go to bed, the injury in his opinion being insufficient for such great care; and yet, at the end of some twelve or eighteen hours, he may become comatose and die in the course of the second day. Where the burn has been caused by the clothes catching fire, a serious result is very often to be apprehended. The terror, excitement, and shock are excessive, while the extent of affected surface is usually great. If the sexual organs be much injured, recovery is a rare event. Supposing the immediate dangers to be escaped, there is still a trying time to be gone through. A fatal termination may be brought about by inflammation of one of the vital organs; or it can happen from the exhaustion produced by pain, inability to take nourishment, excessive suppuration, &c. Now and then, as already mentioned, death has been due to a gastric or duodenal ulcer leading to perforation or hemorrhage.

With regard to the *treatment*, it ought to be recollected that the two very frequent causes of early death after burns and scalds are shock and exhaustion. The latter, especially, is always aggravated by pain. Hence the first object of the practitioner should be to quiet the nervous system, and this will be better effected by a dose of opium and a glass of negus or hot brandy and water, than in any other way. When the suffering is intense, or when the stomach rejects everything that is taken, then it may be advisable to put the patient under the influence of some anæsthetic (F. 313), and at the same time to inject a dose of morphia and atropin (F. 314) under the skin.

Each practitioner has some favorite local application. One of the best in my opinion is the common carron oil—the officinal linimentum calcis—which should be freely applied, and the parts then covered with a sufficient layer of cotton-wool to exclude the atmospheric air. Cotton-wool alone, kept in position by a few light turns of a bandage, at times suffices. Some physicians speak highly of the use of flour, thickly dusted over the burnt or scalded skin, and where there are no vesications it is useful. But when the cuticle is raised into blisters these are apt to burst, and the serum mixing with the flour forms a dirty, irritating paste, which is with difficulty

removed. When the vesicles are large it is better to puncture them with a fine needle to prevent their rupturing; but care must be taken not to remove the elevated cuticle. The patient will generally find it more comfortable to lie between blankets rather than in sheets; while if the mischief be extensive, a water-bed must be used from the first. The importance of not disturbing the first dressings unnecessarily can hardly be too strongly enforced; for independently of the suffering which such meddlesome surgery will always give rise to, the admission of the air to the inflamed surface can only increase the mischief. When suppuration is setting in, warm light poultices or plain water-dressings often give great relief; but if the inflammatory action is severe, cold goulard-water lotions are to be preferred.

At the end of twenty-four or forty-eight hours reaction will be established; and the occurrence of internal congestions will then have to be guarded against. The state of the brain and its membranes, of the lungs and pleuræ, of the heart and pericardium, as well as of the abdominal viscera and peritoneum, must daily be looked to. Simple effervescing salines and mild laxatives are valuable where the reaction is violent, or where there is congestion of any internal organ; and they often suffice to remove all danger. Supposing we have to treat a child under the influence of excessive reaction, great good will arise from inducing copious sweating; and in no way can this be better produced (when the child is irritable and restless, parched and thirsty, and with a hot dry skin) than by taking it out of bed, gently plunging it into a tub of water at 70° Fahr., and then enveloping it immediately in several warm blankets. A copious perspiration will soon break out over the whole body; and this is to be encouraged for several hours by freely giving sweetened water or barley-water.

The subsequent management should depend very much upon the condition of the patient. The numerous symptoms must be combated as they arise; but great caution will have to be exercised in the employment of lowering measures. The progress towards recovery is usually tedious: our object must be to make it sure. The disorganized tissues can only be replaced slowly; and when such replacement is going on satisfactorily our chief duties are limited to removing all sources of irritation, and to taking all the steps we can (by using bandages, splints, india-rubber bands, and other mechanical contrivances) for the prevention of future deformity. It is always advisable to try and support the strength during the whole progress of the case by stimulants in moderate quantities, as well as by such nourishing food as can be digested. Chicken panada, soups, strong beef tea thickened with arrowroot, plenty of good milk, and two or three raw eggs daily, are unexceptionable remedies. Cod-liver oil will often advance the stage of convalescence. At the same time we must take care that the patient does not pass restless nights, but by the use of sedatives give ease and sleep. Even in the case of young children, although they are very susceptible to the influence of opium, yet this drug proves exceedingly beneficial; and when the injury produces great suffering they bear larger doses than in natural disease.*

* The most extensive burn ending in complete recovery that I have read of, has been described by Mr. Grantham. A youth, sixteen years of age, was burnt to the following extent by the explosion of some fireworks in his pockets: the mischief extended from the upper and fore part of the neck, laterally down the left arm to the insertion of the deltoid; it occupied both axillæ; it passed backwards to within three inches of the spines of the vertebræ, over the chest, body, and genitals, to the verge of the anus; and it passed along the upper part of the right thigh, and down the left thigh to the knee. The cuticle, rete mucosum, and corium were destroyed.

A rather extensive observation of nurses and their habits has shown me a favorite practice of these women which has not unfrequently led to most disastrous consequences. At the conclusion of the meal known as "tea," the nurse frequently fills the teapot with water; so then when the children complain of thirst in the course of the evening there may be something for them to drink. In allowing the child to quench its thirst, it is not deemed necessary to pour the cold tea into a cup; but the spout is offered to the lips, and a draught is given. This popular habit leads young children to prefer drinking through the spout as often as the opportunity presents itself; while unfortunately they sometimes avail themselves of the nurse's absence to do so when the teapot contains boiling water, or they even experimentalize with the kettle. Most severe scalds of the fauces, glottis, and pharynx have been thus produced; the spasmodic contraction of the constrictor muscles of the pharynx preventing the passage of the fluid further downwards, and so saving the stomach. In the *treatment* of these cases we must be guided by the principles already laid down: opium, and soothing diluents (such as treacle and water, or mucilage with liquorice, or linseed-tea with honey) being especially required, followed if necessary by the bath. When œdema of the glottis arises, relief may perhaps be given by making rather free scarifications; but if suffocation seems to be imminent, laryngotomy or tracheotomy must be quickly performed. Unfortunately the operation does not often succeed, owing to the prostrating effects of the scald upon the system generally.

VIII. FROSTBITE AND CHILBLAINS.

1. **FROSTBITE.**—Severe cold when long continued produces insensibility, arrest of the circulation, and death of the part to which it is applied. Where the whole frame is exposed to intense cold, the vital powers get much depressed. The heart's action gets diminished in frequency, and there is a strong desire for sleep. If this desire be gratified, the sleep soon passes into coma which will end in death. Examples of frostbite or gelatio [from *Gelo* = to freeze] are very rarely seen in this country; but the unfortunate children of drunken parents have suffered severely from it, after exposure to the keen night air of winter. The management of such cases

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The whole seat of injury measured above six hundred superficial inches; and averaged a quarter of an inch in depth. The subcutaneous structure was completely lost, so that the arteries and veins were seen, as if neatly dissected, lying on the surface of the muscles and the fascia. The period of prostration continued for forty-eight hours, during which there was coma, with a fluttering and rapid pulse, and coldness of the surface: the stage of reaction lasted four days, and was marked by violent retching (relieved after an enema of very salt beef tea), cerebral excitement, and a pulse at times mounting to 200: and then there were twenty-five days of sphacelation, with a typhoid form of fever. Three months after the accident, the patient had a sphacelated wound over the sacrum: four months after this, an attack of bronchitis, with hæmoptysis; and two years subsequently—when he had improved so as to be able to walk a short distance—a severe attack of erysipelas. The treatment consisted in freely giving opium; in well supporting the strength, by beef tea, port wine, six pints of milk daily; in properly protecting the wound, especially with reference to the regulation of the animal heat; and in the external and internal use of antiseptics. Five years elapsed from the time of the burn until the wound healed: during the whole of this time, and even subsequently, there was a greater or less tendency to congestion of the brain.—Facts and Observations in Medicine and Surgery, p. 90. London, 1849.

consists in gradually restoring the circulation to the affected part; friction with snow or cold water, followed by the cautious use of stimulants, being the best means of effecting this restoration.

2. CHILBLAIN.—A chilblain, or mild degree of frostbite, is the result of a suspension of vitality in a limited portion of the skin from the action of cold on the nerves and capillaries. The effect of the cold is not felt at first; but as warmth returns to the affected part there is much itching and tingling, and the toe or finger is found on examination to be red and swollen. This condition lasts for several hours or even days, and the part then resumes its healthy condition; or if the morbid action continue, vesication and ulceration take place, and what is called a *broken chilblain* results. It is essentially a disease of childhood.

The *treatment* must consist in making gentle attempts to restore the normal circulation and tone of the chilled member by frictions with powdered starch or stimulating liniments. For this purpose the iodine ointment, or the iodide of lead ointment, or the iodine liniment, or the ointment of elemi, or the ointment of resin mixed with an equal quantity of turpentine ointment, or the compound camphor liniment, or the turpentine liniment of the British Pharmacopœia, may be prescribed; or the skin may be painted twice daily with the tincture of iodine. When the chilblain has ulcerated, it must be at first soothed by water-dressing or by bread poultices mixed with goulard-water; but subsequently (unless it heals kindly) it is often advisable to apply stimulating ointments, such as the ointment of resin mixed with a little turpentine. The constitutional powers will generally be found to be below the normal standard. Hence tonic medicines (especially F. 405) must usually be required, and attention will have to be paid to the digestive organs.

In the way of prevention few remedies are more serviceable than cod-liver oil, which should be taken once or twice daily through the whole winter. Warm clothing and nourishing food are of course indispensable. Thin and tight-fitting boots and gloves are to be discarded during the cold months.

PART XV.

DISEASES OF THE BLOODVESSELS.

I. AORTITIS.

AORTITIS [from *Ἀορτή* = the great artery; terminal *-itis*], or acute inflammation of the aorta, is such a very rare affection that some physicians almost doubt the possibility of its occurrence. On all hands it is allowed that the mode of origin of the inflammation is unknown. It can only be said that aortitis is probably a blood disease; being perhaps allied to rheumatism, like pericarditis and endocarditis.

The symptoms are so obscure, that aortitis is seldom diagnosed. In the recorded cases there seems principally to have been great general uneasiness, rigors followed by fever, orthopnœa with a frequent sense of suffocation, pain and violent pulsation of the vessel, and great palpitation of the heart. In a very interesting case reported by Dr. Parkes,* a loud, rough, systolic bruit, due to the passage of the blood over a surface roughened by a deposit of lymph, was heard from the third dorsal vertebra down into the lumbar region; while the pulse was irregular and small, though this arose from the aortic orifice of the heart being diseased. The pulse is often unaffected.

The appearances found after death seem to consist of great vascularity, with a thickened pulpy state of the inner and middle coats of the artery. Lymph has sometimes been effused on the internal tunic. On the same membrane small yellow deposits are occasionally seen as the result of syphilis. From the few cases on record it would seem that inflammation of the aorta is very seldom associated with endocarditis,—less frequently indeed than with pneumonia or with pleurisy.

The coats of the aorta may undergo structural changes, either as the result of chronic inflammation or of a simple degeneration of the tissues. Mineral or ossific, amyloid, and atheromatous or fatty degenerations, are most frequently met with in advanced life, although they may occur at an earlier period. In syphilitic subjects, examples of degeneration of the coats and compression of the vessel by gummata have been observed. Andral found ossific plates in the aorta, on five or six occasions, in the bodies of individuals between 18 and 24 years of age. These degenerations are either limited to the aorta (especially to the ascending and transverse portions of the thoracic division of this vessel) or the whole arterial system is affected. The atheromatous and bony deposits are also found in patches

* The Medical Times. London, February 23d, 1850.

of variable size, or the entire calibre of one or more vessels is involved; in either case the walls being deprived of their tone and elasticity, while they are rendered rigid and thick and brittle. Fortunately, these changes progress slowly. At first the deposits lessen the calibre of the vessel, in proportion to their thickness; but at a more advanced period dilatation results, the contractile power of the outer arterial coats being diminished. The other consequences of atheroma and ossification are,—the formation of aneurisms; rupture of all the tunics of the affected vessel; occlusion of the arterial trunk, owing to the deposition of fibrin on the roughened lining membrane; and occasionally gangrene of the tissues beyond the obstructed vessel. In the amyloid degeneration, the tissues supplied with blood by the diseased vessels become involved in the morbid process; as is well seen in the case of the liver, kidneys, spleen, and lymphatic glands.

Returning to the subject of acute aortitis, it is only necessary to say that when the existence of this disease is suspected, warm baths, dry cupping over the spine, counter-irritation by means of blisters, and the administration of iodide of potassium and opium, are the measures to be resorted to. Colchicum might perhaps do good; while ether could be tried to relieve the orthopnœa.

II. AORTIC PULSATION.

Aortic pulsation is a peculiar functional affection which is characterized by violent throbbing, this being usually most observable in the abdominal portion of the vessel. It causes annoyance rather than pain; but at times produces sickness and syncope. The pulsation may frequently, in thin subjects, be seen at the epigastrium, and somtimes at the umbilicus. On applying the hand, a jerking, quick, strong forward impulse is felt; which is synchronous with the heart's systole. Auscultation will possibly detect a systolic bellows-murmur; such being due to anæmia, or to the compression exerted by a tumor lying over the vessel, or to displacement of the artery by disease of the vertebræ, or to simple pressure with the stethoscope. The diagnosis between functional and aneurismal pulsation is somewhat difficult, particularly if any cancerous or non-malignant growth be situated over the vessel. I have found this pulsation not uncommon in cases of uterine disease. It has been frequently noticed in hypochondriacs, in those whose digestive organs are deranged, in structural affections of the stomach and duodenum, in gouty patients, in chlorotic females, &c. Certain foods may also give rise to it, especially strong green tea and tobacco.

The treatment must be directed to the removal of the cause. In a case which was under my care during the year 1853, in the Hospital for Women, the pulsation produced so much sickness and distress that it was frequently necessary to control it by the application of ice to the abdomen, and by the administration of morphia. Hohnbaum, who suffered for some years from this disease in connection with dyspepsia, says that he derived the greatest relief from the use of the aperient waters of Carlsbad, change of air, and complete relaxation from his professional duties. In most cases, considerable benefit will arise from the employment of bark and some mineral acid, or from quinine and steel, or from phosphate of zinc and nux vomica; from attention to the functions of digestion; from friction along the spine with a liniment containing belladonna; as well as from

sea-bathing. The diet ought to be nourishing; substituting dry sherry, or brandy and water for beer, and milk (or cocoa made with milk) for tea and coffee.

III. CONTRACTION AND OBLITERATION OF THE AORTA.

That contraction of the aorta, sometimes going on to complete obliteration, may occasionally occur near the termination of the arch of the vessel (about the point where the ductus arteriosus is united with it), has been well known since M. Reynaud recorded an example of the kind in 1828.

From an elaborate analysis of forty cases by Dr. Peacock,* it appears that the aorta gradually diminished in size, or the contraction commenced abruptly; that when abrupt, the vessel often looked as if a piece of string had been tied round it; that the internal tunics were frequently more contracted and thickened than the external; and that in ten instances, the obliteration of the canal was complete, while in the remainder, the contraction varied, so that in some only a probe could be passed through the stricture, though in others the little finger might be introduced. The ascending portion of the arch was generally dilated, whilst the coats were thickened or atheromatous or osseous; but below the seat of stricture the vessel was often dilated, and then became contracted. Although the blood had been conveyed imperfectly, or not at all, by the trunk of the aorta from the upper into the lower portion of that vessel, yet the circulation had been maintained with considerable freedom in the lower parts of the body by a compensatory collateral circulation; the collateral channels, however, affording a less free passage than the healthy vessel would have done. Hence, the changes produced in the heart consisted chiefly of hypertrophy and dilatation of the cavities, such as might arise from any form of aortic obstruction. The patients were of all ages, from a child twenty-two days old, to a man who was ninety-two; and the defect was more common in males than females. Death occurred, in one set of cases, from acute or chronic diseases, having little or no connection with the morbid condition of the vascular system; in a second set, the death was sudden, and traceable to the condition of the aorta; while in the largest proportion, the patients sank with symptoms of cardiac asthma and dropsy, sometimes complicated by pneumonia, bronchitis, pericarditis, erysipelas, sloughing, purpura, &c. Dr. Peacock agrees with those writers who regard the stricture as originating in, or being connected with, some error in the original conformation of the vessel.

IV. ANEURISM.

Three principal forms of Aneurism [from *Ἀνευρύνω* = to dilate] are usually described. *True* aneurism, in which all the coats of the artery dilate and unite in forming the walls of the pouch; *false* aneurism, in which the inner and middle arterial tunics being ruptured, the walls are formed by the cellular coat and contiguous parts; and *mixed* or *consecutive false*

* British and Foreign Medico-Chirurgical Review, vol. xxv, p. 467. London, 1860.

aneurism, in which the three coats having at first dilated, the inner and middle ones subsequently rupture as the distension increases. When the two inner tunics are ruptured, and the blood forces its way between them and the outer coat by a kind of false passage, so as to form a spreading diffused tumor, the disease is known as a *dissecting* aneurism. And lastly, *varicose* aneurisms are those where a communication has formed between the aorta and either of the venæ cavæ, or between the aorta and one of the auricles, or between this vessel and the right ventricle, or between the aorta and the pulmonary artery.* The latter is much more common than either of the other varicose aneurisms.

Aneurism is more common in men than in women. Thus, according to the Registrar-General's returns, there were in the year 1866, in England, the following number of fatal cases of aneurism, viz., $\frac{\text{Males } 325}{\text{Females } 125} = 450$. In males the greater number of deaths occurred between the ages of 25 and 35; in females, between 45 and 50. The average annual mortality from this disease, in both sexes, for the ten years, 1857 to 1866, has been 402.

Aortic aneurism is a disease of the middle and somewhat advanced periods of life, rather than of youth. It often results from ossific or calcareous deposits, or from atheromatous or fatty degeneration of the coats of the vessel, or from corrosion of the coats produced by some syphilitic deposit; and consequently other vessels are not uncommonly found affected at the same time. When the tumor is small, its existence frequently goes undetected; the diagnosis under such circumstances, as well as during the early stages, being obscure. Death generally results from hemorrhage owing to rupture of the sac; but it can also occur suddenly without any rupture, as from suffocation; or it will take place gradually from exhaustion caused by the long-continued suffering; or it may be due to debility brought about by the repeated escape of small quantities of blood; or it may happen from coexistent tubercular consumption.

1. ANEURISM OF THORACIC AORTA.—This disease is chiefly met with in the ascending portion, or in the transverse part of the arch of the vessel.

The general *symptoms* are very obscure, partly in consequence of their similarity to those arising from disease of the heart. In cases where the tumor is of considerable size and has been quickly developed, there is usually disturbed action of the heart, with some modification of the radial pulse; the superficial veins of the chest and neck are turgid; one or both upper extremities are œdematous; there is dulness on percussion around the portion of the vessel from which the aneurism springs; and there is cough, wheezing, dyspnœa, hæmoptysis, difficulty in swallowing, and pain about the chest and back. The latter is most constant and severe when erosion of the bones of the spine or sternum or ribs is going on; and it is often confined to one spot. Supposing the aneurismal tumor becomes very large and pulsating, and that it rises out of the chest, producing protrusion or absorption of the sternum and ribs, then the diagnosis is altogether as easy as it was before difficult. When the sac presses upon the trachea, there is much dyspnœa and cough; when on one or both recurrent laryngeal nerves, the chief symptoms are aphonia with troublesome cough,

* For examples of all these forms of varicose aneurism, the reader should refer to a paper by Mr. Thurnam in the Medico-Chirurgical Transactions, vol. xxiii, p. 323. London, 1840. In the same work (vol. xliv, p. 211, London, 1861) there is an account of a case of Aortic Aneurism, in which a communication with the Pulmonary Artery was recognized during life, by Dr. Willoughby Francis Wade.

severe paroxysms of laryngeal suffocation, and pain, which comes on at intervals; when the pressure is on the œsophagus, dysphagia and symptoms of stricture result; and when on the thoracic duct, inanition and engorgement of the absorbent vessels and glands are the consequences. In those cases where an aneurism of the ascending aorta is in the immediate neighborhood of the heart, Dr. Gairdner has remarked that the patient suffers from angina pectoris; which he believes is probably to be referred to compression of the great plexuses of nerves ramifying on either side of the ascending aorta, and communicating freely with the cardiac ganglia and plexuses of the ventricles.

When a cervical or thoracic aneurism extends backwards deeply towards the vertebral column, so as to exert considerable pressure upon some parts of the ganglia or branches of the sympathetic, it may give rise (as Dr. W. T. Gairdner first pointed out) to permanent contraction of the pupil of the affected side. This contraction is probably due to paralysis of those muscular fibres which radiate from the edge of the pupil and which by their contraction dilate the aperture in the iris, such fibres being supplied by the sympathetic. On the contrary, it has been shown by Dr. John W. Ogle that when the pressure is only sufficient to irritate the branches or trunks of the sympathetic, then the force merely acts as a stimulus to the dilator fibres of the pupil, enabling them to overbalance the resisting contractors, and so to produce a dilated pupil. Moreover, if the pressure continue slight, the dilatation will remain; but should it increase, then contraction of the pupil usually ensues. As signs of aneurism, however, the value of these conditions is diminished by the circumstance, that any tumor which extends in a similar direction, and which gives rise to the necessary pressure, will have the same effect.* Dr. Kussmaul has proved that obstructing the flow of blood through the carotid artery produces a contracted pupil; but this contraction only lasts for a short time, and is followed by dilatation.

Aortic aneurism is sometimes accompanied by a bellows-sound, sometimes not. If the tumor compress the heart, so as to impede the normal action of the valves, a systolic or diastolic bruit will result. Pressure on the aorta, or on the pulmonary artery, may also produce a murmur. In false aneurism there is generally a murmur both with the entrance and exit of blood into the sac; or there may be one loud, prolonged, rasping bruit, from the passage of the blood over the roughened inner surface of

* The conclusions which Dr. Ogle believes may be drawn from his researches are these: "That certain movements of the iris (the contraction and dilatation of the pupil) are under the control of certain fibres of the sympathetic nerve emanating from the carotid and cavernous plexus, as are also frequently to some degree, at least in lower animals, the movements of the levator of the upper eyelid and the external rectus muscles of the eyeball. That these sympathetic nervous twigs are derived secondarily from the great sympathetic trunks in the neck, but primarily from certain parts of the spinal cord, by communication between these grand trunks and the spinal nerves. That consequently, the same effects produced upon the iris, the levator palpebræ, and external rectus, by interference with the sympathetic in the neck, will follow if the communications passing between it and the cervical part of the spinal cord, or the cord itself, be similarly affected. That, as a rule, paralysis of the dilator fibres of the iris (permitting contraction of the pupil) and, in many animals, partial paralysis of the levator palpebræ and external rectus muscle, follow section of, or extreme pressure upon these parts of the nervous system; whilst mere irritation by electricity, and stimulating chemical and mechanical agents, induce a dilatation of the pupil. Bearing in mind the results of the above-mentioned experiments upon healthy animals, it is to be expected that under disease any pressure or lesion of the cervical sympathetic or its ganglia, or its connections with the spinal cord, would tend to produce effects on the iris similar in kind at least to those arrived at by experiment." Medico-Chirurgical Transactions, vol. xli, p. 411. London, 1858.

the vessel. In true aneurism or mere dilatation of a part of the wall of the artery, murmurs are seldom audible. A small but free opening from the canal of the artery into the aneurismal sac, and a roughened state of the arterial tunics from degeneration or from atheromatous deposit, are, however, two conditions which will give rise to a bruit. With both forms, when a murmur exists, a peculiar thrilling or purring tremor will be felt on applying the hand over the sternum.

The indications afforded by the sphygmographic characters of the pulse in cases of aneurism of the aorta are not very striking. As described by Marey, the trace shows the following modifications of the healthy curve: (1) A slight diminution in the force of the pulse. (2) Modifications in the intensity of the dicrotism. And (3) a dissimilarity in the pulse-traces of the two radial arteries. This last sign is constant and very important; and is present even when the dissimilarity is so slight that the most practiced touch cannot detect it with the fingers over the radials.

The aneurism may prove fatal by bursting externally, or into the pericardium, or into either pleural cavity, or into the trachea, or into one of the bronchial tubes. When some of the vertebræ have become eroded by the pressure of the sac, the hemorrhage has sometimes taken place into the spinal canal. It is curious that occasionally aneurismal patients expectorate blood, to the extent of several ounces, for weeks or months before death. Dr. Gairdner has directed the attention of the profession to a case in which the first gush of blood took place four years and eight months before the patient's death; blood being also expectorated in varying quantities at different times during this period.* I have already mentioned the case of Mr. Liston (p. 89), in which five months elapsed between the first and only attack of hæmoptysis, when many ounces of arterial blood were brought up, and death. Very rarely, a spontaneous cure is effected by the sac becoming filled with firm and thick layers of fibrin; a solid tumor resulting, which does not increase in size.

In many cases of aortic aneurism there is destructive inflammation of the lung, attended with violent cough, dyspnœa, pain, and perhaps hæmoptysis; the inflammation and gangrene being due either to compression of the pulmonary vessels cutting off the supply of blood, or perhaps to pressure on the pneumogastric nerve diminishing the nervous force and consequently interrupting the nutrition of the affected lung.

The *treatment* of these cases is the same as that required in aneurism of the abdominal aorta.

2. ANEURISM OF ABDOMINAL AORTA.—The aneurism often gives rise to acute tenderness in the lumbar region. There is also pain shooting into either hypochondrium, and extending downwards into the thighs and scrotum. Constipation aggravates the pain, while lying on the face often affords remarkable relief. By careful examination a tumor may generally be felt, which communicates a constant and powerful pulsation to the hand. On applying the stethoscope a short, loud, abrupt bellows-sound will be heard.

In the *diagnosis* of aneurism it is necessary to remember that simple or malignant tumors having their seat over the healthy artery, receive pulsation from it. Moreover, if such growths cause much pressure upon the aorta they may produce a murmur; if they press upon the trachea and œsophagus, there will be dyspnœa and dysphagia: whilst in either case we

* Clinical Medicine: Observations recorded at the Bedside, with Commentaries, p. 509. Edinburgh, 1862.

shall find dulness on percussion. Our diagnosis must be made by a consideration of the history; by noticing that aneurisms pulsate from the first, while tumors only appear to do so when they acquire some size; by remembering that tumors are hard and firm from the commencement, whereas aneurisms only become so subsequently; and by observing that gentle continued pressure will often diminish the size of an aneurism.

The *treatment* of aortic aneurism—whether thoracic or abdominal—must consist in recommending the avoidance of all bodily and mental excitement; in giving relief to the pain, cough, dyspnœa, and other prominent symptoms; in allowing the use of a generous reparative diet, with a little wine or brandy and water, but forbidding malt liquors of every kind; and in paying attention to the digestive, secreting, and excreting functions.

The method of cure proposed by Valsalva and Albertini, and which has been since often adopted up to the present time, involves the bleeding of the patient frequently, and the keeping him upon the lowest possible diet compatible with the sustenance of life. By these means it was thought that the force and velocity of the blood would be diminished, and that coagulation would take place in the aneurism. Since, however, the coagulation of fibrin seems to be impeded by diminishing its quantity, and as the rapidity of the circulation and the throbbing of the arteries are increased by depletion, Valsalva's method would seem to produce effects the very opposite to those wished for; and such is the fact. Dr. Copland says he has seen cases "in which aneurismal tumors had existed for some time without any increase, so long as the patient avoided any marked vascular excitement and continued his accustomed diet; but when repeated depletions and vegetable or low diet were adopted, great augmentation of the tumor, and fatal results followed."

In advanced and aggravated cases we can only endeavor to palliate the various symptoms as they arise. Thus the pain and depression will always be moderated by opium, which may often be advantageously used in the form of subcutaneous injections; the harassing cough may generally be relieved by sedatives and expectorants; the paroxysmal attacks of laryngeal dyspnœa, when threatening the extinction of life, might be removed by the careful performance of tracheotomy; the dropsy can be often lessened by mercury, digitalis, squills, juniper, juice of broom, and other diuretics; while the heart's action may be regulated and moderated by assafœtida, camphor, digitalis in small doses, and particularly by aconite. With all cases, experience no less than common sense teaches us to avoid too debilitating a plan of treatment. This is especially proved by the fact, that of all the causes of aneurism a degeneration of the arterial coats is the most common. Nevertheless, where there is considerable pulmonary congestion, a small venesection may often afford relief; the lowering effects of the loss of blood being compensated for by a liberal diet.

Since the fourth edition of this work was published in 1861, three special methods of treating aneurismal tumors have been proposed: (1.) The first plan consists in the introduction of a quantity of fine iron wire into the aneurism, with the object of affording an extensive surface upon which fibrin may coagulate. This practice was adopted by Dr. Murchison and Mr. Charles H. Moore in a case of saccular aneurism of the ascending aorta projecting through the anterior wall of the left side of the chest; upwards of twenty-six yards of wire being passed through a small pointed canula inserted into the tumor. Although the treatment was unsuccessful—it was not adopted until it was clear that the patient could not live many days—yet the experiment showed that the principle was sound, and that further trial (with some modifications) would be at least justifiable.

The practice is only applicable to a sacculated aneurism; and not to one which has two orifices, since fragments of fibrin would be broken off by the force of the current.*

(2.) Dr. William Murray, of Newcastle-on-Tyne, has had the satisfaction of curing a case of aneurism of the abdominal aorta by compression of this vessel immediately above the tumor. The first attempt failed; but on April 19th, 1864, the patient (a man twenty-six years of age) was kept under the influence of chloroform for five hours, during which time pressure was maintained by a properly constructed tourniquet. It was only, however, during the last hour that pulsation in the tumor could be found to have almost ceased on the removal of the instrument; the tumor having become quite pulseless by the evening. Three months afterwards the man was at work as an engine-fitter; the tumor being scarcely appreciable, while the aorta, and iliacs, and femoral arteries were quite pulseless. This case proves that the aorta has been occluded without either temporary or permanent serious disorder, and that there must be a collateral system of vessels so complete as to carry on the circulation when the aorta is blocked.† Dr. Murray believes that in the *rapid pressure treatment of aneurism* the cure takes place by the coagulation of the blood in the sac, and not by the deposition of fibrin. To prevent any mishap or failure the patient must be thoroughly under the influence of some anæsthetic, so as to permit the application of a powerful pressing instrument on sensitive parts, as well as to restrain all muscular action; for success depends upon the complete arrest of all movement of the blood in the aneurismal sac, with retention of this fluid in a motionless state, just as happens from the application of a ligature to the artery above the seat of disease. Dr. O'Ferrall has advised the use of distal as well as proximal pressure, a suggestion which has been successfully carried out by Dr. Mapother. Distal pressure, however, is seldom needed in the treatment of aneurisms requiring pressure on the abdominal aorta; since, as Dr. Murray remarks, the collateral circulation to the lower parts of the body is here so limited as to render a current into the distal orifice of the aneurism improbable. As regards the duration of the treatment we are not in a position to lay down any rule. It must depend on the cessation of all pulsation in the tumor. In an example of aneurism of the abdominal aorta treated by Dr. Heath, at Sunderland, consolidation occurred within twenty minutes of the second attempt; the first trial, with irregular pressure for ten hours, having failed.

(3.) Dr. William Roberts, of Manchester, has recorded a case of aneurism of the arch of the aorta making its way through the parietes of the chest, which was treated by iodide of potassium in doses of five, seven, ten, fifteen, and twenty grains three times a day, and with apparently most marked benefit. Several other cases are mentioned, in which similar results were manifested. Nélaton, Bouillaud, Andral, and Beau have recorded corroborative experiences, and from these Dr. Roberts collects and gives an account of twelve cases. In all of them, save one, striking relief of suffering followed the use of the drug; in eight, an undoubted diminution in the size of the sac took place; and in a few, complete subsidence of the swelling seems to have occurred. The cases of Dr. Chuckerbutty would appear to indicate that the beneficial effect of the iodide was owing

* Medico-Chirurgical Transactions, vol. xlvii, p. 129. London, 1864.

† Ib. p. 187. London, 1864. A further report of the case, showing that the cure was complete, is to be found in the Medical Times and Gazette, p. 383, April 15th, 1865. See also the British Medical Journal, p. 287. London, October 5th, 1867.

to its power (hitherto wholly unsuspected) of increasing the coagulability of the blood. Dr. Wilkinson's case lends support to this view; for not only was the sac lined with layers of fibrin, but a very firm and decolorized fibrinous mass attached on one side, floated in the cavity of the aneurism.*

3. CEREBRAL ANEURISMS.—An examination of pathological museums, as well as a search for the records of cases of intracranial aneurisms, might lead to the belief that these affections were very rare. There can be little doubt, however, that when these aneurisms have proved fatal by rupture, their existence has often been overlooked. The physician, finding a more or less extensive cerebral clot, has decided that death has been due to "apoplexy;" no attempt having been made to trace the escape of blood to its origin.

Several authors have gathered together the histories of eight or ten reported cases. The largest number, however, was collected by Dr. Brinton from various journals and treatises.† In the table given by this gentleman are the notes of 52 cases, and I have since found reports of eight more examples. Doubtless, others have been overlooked. An examination of these 60 cases has afforded the following results: (1) With regard to sex, males have suffered in the proportion of two to one. (2) The average age has been forty-one. The two extremes have been fourteen years and sixty-five. (3) The aneurism has been seated in the internal carotid, the middle cerebral, the anterior cerebral, the posterior cerebral, the basilar, the vertebral, or in the anterior or posterior communicating arteries. In the greater number of cases the basilar has been the diseased vessel. (4) The size of the tumor has varied from that of a pea to that of "a large egg." (5) In about half the cases death has occurred from rupture. In the other half the fatal result has been due to the pressure causing epilepsy, or cerebritis, or cerebral hemorrhage, &c. And (6) in four cases the aneurisms were multiplied; that is to say, both internal carotids were affected, or there were two dilatations of the same vessel.

The symptoms produced by intracranial aneurisms seem liable to great variety. The chief have been fixed pain in the head, irremediable giddiness, attacks of epilepsy, intolerance of light, &c. Ofttimes there has been no inconvenience. The presence of this disease can seldom be diagnosed during life.

V. DISEASES OF THE PULMONARY ARTERY.

Although the diseases which affect the pulmonary artery are important, yet they have scarcely attracted as much attention as they merit. This is in some measure owing to their comparative rarity, and partly to the obscurity which clouds their diagnosis.

The pulmonary artery is an anomalous vessel; its coats being constructed like those of arteries in general, while its tissues are pliable and extensible like those of veins. It is about two inches in length, is about the same size as the aorta, is furnished with three semilunar valves at its origin from

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* British Medical Journal, p. 83. London, January 24th, 1863.

† Transactions of the Pathological Society of London, vol. iii, p. 47. London, 1852.

the left side of the right ventricle of the heart, and it terminates in two branches of equal size—the right and left pulmonary arteries. Its office is that of a vein, viz., to convey the impure venous blood from the right side of the heart to the lungs.

Examples of *inflammation* of the coats of this vessel have occasionally been met with. The reports of many of these are, however, but of little value; since the cases occurred when our knowledge of the spontaneous coagulation of the blood during life was very imperfect, and when the presence of a fibrinous deposit in an artery (thrombosis) was regarded as a consequence of inflammation. In the very excellent work of Dr. Norman Chevers* it is stated that acute inflammation of the pulmonary artery is found to occur under the following circumstances: (1) As a sequence of phlebitis. (2) In cases of Bright's disease, and in persons habitually intemperate. (3) As a result of exposure to cold, and from rheumatism. And (4) as an accompaniment of certain forms of pneumonia. The chief sign which Dr. Chevers seems to rely upon as showing that inflammation has been present is the occurrence of *adherent* clots in the vessel; but it has been argued by Mr. Paget and others that diseased blood (such as that contaminated with urea) has a greater tendency to adhere to the walls of the vessels than blood which is healthy.

Morbid growths are very seldom found in the pulmonary artery. Dr. Chevers quotes the history of an illustrative case which occurred in the practice of Dr. Edmund L. Birkett. The patient was a poor woman, 25 years of age, "inhabiting an ill-ventilated room in a badly-drained part of Bermondsey," who had been frequently subjected to exposure to cold, and who in consequence had suffered from several attacks of thoracic inflammation. When visited, fourteen days after the commencement of her illness, her aspect was anxious and distressed; there was great dyspnœa, almost amounting to orthopnœa; she had a slight cough, without any expectoration; and the pulse was feeble, quick, sharp, and vibrating. She complained much of pain about the præcordial region, and of palpitation. The heart's action was tumultuous, its rhythm normal, and its impulse stronger than natural. The treatment consisted of local depletion, counter-irritation over the region of the heart, mercury, salines, and purgatives. Death took place on April 2d, 1846, about six weeks after Dr. Birkett first saw her. At the autopsy there were found,—extensive old pleuritic adhesions, with congestion of the lungs; a smooth pericardium, white and opaque at parts; a large heart, with its nutrient vessels much gorged; while "within the pulmonary artery, at its point of division, was a circular space as large as a fourpenny-piece, surrounded by a ring of vegetations, to which was slenderly attached a mass of the size of a large walnut, of a yellowish color, and in substance resembling the roe of a mackerel."

The canal of the pulmonary artery may become *contracted* or *obstructed*. These conditions are generally due to the formation of a fibrinous clot; or they can arise gradually owing to the pressure of a cancerous or innocent tumor, or to that exerted by an aortic aneurism, or to that produced by extensive thoracic effusion in double pleurisy. Dr. Barlow has especially directed attention to the cases of young patients, who from birth have suffered from an ill-developed condition of the respiratory apparatus, in connection with congenital narrowing of the pulmonary artery. Again, it has often been observed in examples of phthisis, that the heart's cavities are diminished in size, the calibre of the aorta and pulmonary artery being

* Collection of Facts illustrative of the Morbid Conditions of the Pulmonary Artery, p. 82. London, 1851.

likewise lessened. In all such cases, either constant or only paroxysmal dyspnœa is a prominent symptom. Dr. Chevers was the first to point out the distinctive circumstance that, in a large proportion of cases, individuals suffering from great narrowing of the pulmonary artery, select the recumbent position, either habitually or during the paroxysms of difficult breathing; while the subjects of any other form of obstruction to the circulation through the lungs, or through the left heart, breathe most freely when the shoulders are raised and the body is placed almost vertically. The reason why the horizontal posture is the easiest in narrowing of the pulmonary artery is, that the distress of breathing results from the insufficient access of blood to the lungs; and hence the recumbent position not only affords the aid of gravitation to the contractile efforts of the heart, but also renders the supply of arterial blood to the brain more free than it could otherwise be. The other symptoms of some impediment to the passage of blood through the pulmonary artery are: a superficial systolic murmur, which is heard in the course of the vessel, and over the base of the right ventricle; an habitually small, rapid, regular pulse, usually with excessive action of the heart; together with a livid hue of the surface, where the obstruction is considerable.

The remaining morbid conditions of this vessel are, *dilatation*, which generally follows hypertrophy of the right ventricle, the consequence of long-standing vesicular emphysema; *ulceration*, owing generally to the pressure exerted by an aneurismal tumor of the arch of the aorta; and *rupture*, either as the result of mechanical injury, or of a degeneration of the coats of the vessel. The occurrence of *aneurism* in this vessel has been rarely observed. According to Dr. Chevers, the great dilatability of the ascending portion of the artery appears to be the principal cause of its immunity from this lesion: while its internal branches are still further protected by the elastic support afforded by the lung-tissue. Sometimes, doubtless, an aneurism has been present, but it has been overlooked. When an aneurism has formed in cases of tubercular phthisis, the rupture of the sac has produced fatal hæmoptysis.

VI. PHLEBITIS.

Phlebitis [from *Φλέψ*, *φλεβός* = a vein; terminal *-itis*], or inflammation of the veins, depends upon, or is generally accompanied by, disease of the blood. Mr. Henry Lee has distinctly shown that the lining membrane of veins has a very slight tendency to inflammation; that the morbid action is much less mischievous than it used to be considered, unless it be accompanied by the admixture of decomposing fluids with the blood; and that the internal coat when inflamed does not exude lymph as a serous membrane does. Indeed, it is now well known, from recent experiment and observation, that the doctrines of the effusion of lymph from the lining membrane of veins, and the formation of pus by the same, are quite untenable. As Virchow has proved, the history of the affections of veins to which the term phlebitis has been hitherto applied, is really the history of the coagula (thrombi) formed within them, and of the metamorphoses through which these coagula pass.

The *symptoms* of phlebitis are pain, which is increased on pressure, swelling, stiffness, and redness in the course of the vessel, generally spreading

upwards towards the heart. When suppuration results, it is usually accompanied, or perhaps preceded, by rigors and flying pains in various parts of the body. The constitutional disturbance is always great. The result of the admixture of pus or other morbid fluid with blood is to cause the latter to coagulate; in this way a vein sometimes becomes filled with a coagulum; when, if the morbid matter is of such a nature that it ought to be eliminated, the connective tissue around inflames, suppuration and abscess follow, the coats of the vein ulcerate, and the contained clot is discharged by means of the abscess. On the other hand, where the poison does not produce coagulation it mixes with the circulating blood, affects the whole system, and is subsequently deposited in distant parts—as in the lungs, liver, spleen, eye, joints, areolar tissue, &c. Under these circumstances, the consequences are always very serious.

The *treatment* consists in employing rest, fomentations and poultices, and purgatives. When the system is low, stimulants and tonics will be necessary; especially good beef tea, port wine or brandy, ammonia and bark, and opiates to relieve the restlessness.

Phlebolites [from Φλὲψ = a vein + λίθος = a stone] are occasionally met with in the veins; and as they generally lie in dilatations, they do not obstruct the flow of blood. These bodies vary in size from that of a millet-seed to that of a pea. There may be only one or two calculi, or a dozen or more. They are chiefly composed of phosphate of lime, carbonate of lime, and animal matter. Phlebolites are probably formed by calcareous deposits from the blood, thrown around a small coagulum; as hepatic calculi are produced by depositions from the bile upon fragments of cholesterin.

One or more of the large veins have been found compressed by *syphilitic gummous substance* deposited around the coats. In such cases, other evidence of the cause of the disease, confirmatory of the diagnosis of syphiloma, has been present. The amount of venous distension and swelling beyond the seat of pressure will of course depend on the extent to which the passage of blood through the affected vessel is obstructed. Unless the complications are of such a nature as to preclude all hope of recovery, treatment by large doses of iodide of potassium and bark, or by chlorate of potash and steel, should be adopted.

VII. AIR IN THE VEINS.

The very great danger which results from the entrance of an appreciable quantity of air into a vein during a surgical operation has long been recognized. The important bearings of this subject, however, on the practice of obstetrics, as well as on the treatment of uterine diseases, have been less appreciated; though they are deserving of very serious attention.

The characteristic symptoms of the occurrence of this accident during an operation upon the breast, neck, shoulder, or axilla, are the following: Suddenly, while all seems going on well, a hissing, or gurgling, or bubbling sucking noise is heard; the countenance becomes pallid or livid, and sometimes intensely red at a later period; the pulse gets nearly or quite imperceptible, and the respiration labored; while perhaps there set in violent and irregular action of the heart. The patient, when not under the influence of

an anæsthetic, complains of extreme faintness and oppression of the chest, or perhaps has merely time to exclaim "I am dying;" and death often follows very quickly, perhaps with a convulsion, but frequently without a struggle. In the greater number of fatal cases, the autopsy has revealed the presence of air in the right cavities of the heart, the air being free, or mingled with the blood, which is thus rendered frothy; while sometimes bubbles of air have also been found in the larger veins, as well as in the branches of the pulmonary vessels. The cause of death is the mechanical interference of the air with the action of the heart, and the difficulty of forcing frothy blood through the pulmonary capillaries; severe syncope ensuing, owing to the deficient supply of blood to the brain. The warning symptom is the hissing noise; and directly it is heard the surgeon should compress the wounded vein, so as to prevent the further ingress of air. The patient ought then to be placed in the recumbent posture; ammonia is to be held to the nose, while brandy is administered by the stomach or rectum; artificial respiration is to be perseveringly and steadily employed; while the extremities may be rubbed upwards, so as to force on the circulation towards the brain. In very severe cases, the application of galvanism to the thoracic muscles must be tried. When death has happened, the quantity of air which has entered the heart has been considerable; the amount having probably been small in those instances where the dangerous symptoms have passed off and recovery has ensued.

When the air enters the circulation through the uterine veins, the symptoms are as well-marked as in the surgical cases. Attention seems to have been first directed to this occurrence by Legallois, in 1829; who, while watching a rabbit that had had two successive inversions of the uterus after parturition, noticed that she suddenly struggled convulsively and died in less than three minutes. The right auricle was found full of air-bubbles, while air was also discovered in the pulmonary artery, venæ cavæ, &c. This eminent physiologist also observed the same occurrence in two other animals; and Oliver in remarking upon these facts asks,—"Is it to a cause of this kind that we ought to attribute the sudden and unexpected death in women lately delivered, and where the autopsy has disclosed nothing which could account for such a catastrophe?"* In 1844, Professor Simpson saw a patient who had been delivered of twins an hour or two previously. There was hemorrhage, with alternate contractions and relaxations of the uterus; she had a very weak and rapid and almost imperceptible pulse, with an extremely anxious countenance; while here and there was an evanescent scarlatinoid rash over the surface of the body. A few hours after death, the abdominal contents were exposed under water; the uterine and hypogastric veins and lower vena cava being found full of frothy blood, the air bubbling up through the water when these tubes were opened.† In 1850, Dr. Cormack read a paper on the entrance of air by the uterine veins before the Westminster Medical Society; in which he showed, amongst other points, that the communication between the cavity of the womb and the current of blood in the inferior vena cava is direct and easy, so that air once introduced into the uterine veins must soon be carried to the right auricle; there, if in sufficient quantity, to cause frothing of the blood, aeriform distension of the right side of the heart, obstruction of the pulmonary artery, and congestion of the pulmonary capillaries.‡

* Dictionnaire de Médecine, article "Air," p. 73. Paris, 1833.

† Physiological, Anatomical, and Pathological Researches. By John Reid, M.D., p. 579. Edinburgh, 1848.

‡ London Journal of Medicine, vol. ii, for the year 1850, pp. 589 and 928.

And then, in 1857, Dr. George May, of Reading, collected the histories of eleven cases, in which death during or soon after labor had been more or less sudden, owing as he believed to the entrance of air through the uterine veins. In one of the cases which Dr. May saw himself, the labor had been natural and the patient had resumed her duties; when, on the eighth day after delivery, she was taken suddenly ill and expired. On the following day, frothy blood was seen on slicing the liver, there was air in the inferior vena cava and in the venæ portæ, and the right side of the heart was distended with frothy blood.*

Again, not only has the entrance of air through the uterine veins caused death at the time of labor, but it has likewise proved fatal in disease. Thus, Professor Oppolzer has related an instance of uterine carcinoma, in the course of which air entered the circulation spontaneously, and caused death in about twenty-four hours.† Scanzoni has shown the great risk which attends upon making gaseous injections into the uterus. A woman who was pregnant, the pregnancy being masked by attendant circumstances, was about to have the neck of the uterus amputated. Her father, a physician, wished to practice injections of carbonic acid gas into the uterine neck, so as to produce contraction of the vessels and obviate hemorrhage. He tried a first injection with the aid of an elastic reservoir; but scarcely had two or three cubic inches of gas penetrated the gaping mouth of the cervix, when the patient cried out that she felt air entering the abdomen and head and neck. Immediately afterwards she was seized with general tetanic convulsions; respiration became laborious and stertorous; the pulse got rapid and small; the extremities grew cold; and death followed at the end of an hour and three-quarters. The autopsy revealed nothing but considerable pulmonary œdema.‡ In a paper read before the Obstetrical Society of London by Dr. Robert Barnes, this gentleman stated that several cases in which death has speedily followed the injection of fluids into the cavity of the non-pregnant uterus are known, and he remarked that unless great care be taken, some air is very apt to be thrown up with the water by any of the ordinary siphons or pumping syringes. He quoted also an instance reported by Dr. Guillier, in which injections of water being ordered to cleanse the vagina of a woman wearing a pessary, death almost suddenly followed their employment.§

The treatment of these cases must be conducted on the same principles as guide the surgeon when air enters a vein during an operation. Unfortunately, however, there is greater difficulty in following out the indications. Thus, to prevent the further ingress of air we can only plug the vagina, an operation which cannot be performed in a few seconds. Still, stimulants may be administered, and artificial respiration had recourse to; while warmth can be applied to the extremities, cold water dashed over the face and chest, and the patient kept absolutely quiet in the recumbent posture. To prevent the occurrence of such an accident as has now been described, the use of uterine injections, whether of fluids or of carbonic acid gas, ought to be abandoned.

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* British Medical Journal, June 6th, 1857. Also in the Half-Yearly Abstract of Medical Sciences, vol. xxvi, p. 232. London, 1858.

† British and Foreign Medico-Chirurgical Review, vol. xxx, p. 550. London, 1862.

‡ Ibid., vol. xxiv, p. 274. London, 1859.

§ Transactions of the Obstetrical Society of London, vol. iii, p. 118. London, 1862.

VIII. PHLEGMASIA DOLENS.

Phlegmasia dolens [from $\Phi\lambda\acute{\epsilon}\gamma\omega$ = to burn; *doleo* = to be in pain], milk-leg, or white-swelling, may be defined as a brawny, non-œdematous, painful swelling of one or both lower extremities, attended with depression of the vital powers. It probably depends upon the spontaneous coagulation of blood within the internal or external iliac and femoral veins; the coagulation being due to the reception within these vessels of some poisonous or acrimonious fluid, or merely to a cachectic state of the system. The disease commences for the most part, and especially in puerperal women, in the uterine branches of the hypogastric veins. It has been termed obstructive phlebitis, by those who contend for its inflammatory origin. It is most likely that the lymphatics are also involved in the morbid action, and that they become obstructed.

Phlegmasia dolens is very common after parturition, especially in women who have been much weakened by flooding, or other causes; while it is rarely met with after first labors. It also occurs not unfrequently towards the termination of uterine cancer. The left leg is said to be more frequently attacked than the right.

Symptoms.—The disease commences generally, in from one to five weeks after labor, with fever, headache, thirst, nausea, and pain. Sometimes it begins with a chill or rigor. At the end of twenty-four or thirty-six hours, there is swelling, with loss of motor power in one of the lower extremities (both limbs are very seldom affected); the swelling often commencing about the foot or lower part of the leg and extending upwards, though sometimes it begins at the upper part of the thigh and proceeds downwards. The limb is unnaturally hot, tender, not œdematous, but swollen perhaps to twice its natural size; it is of a pale white color, and is tense and elastic; while it has also a glazed or shining appearance. The acute stage generally lasts about fourteen or twenty-one days; but the limb frequently remains swollen and feeble, or almost useless, for many weeks or even months.

Prognosis.—This is generally favorable, the disease very rarely proving fatal. As the general health is improved, the swelling and tenderness decrease; although some tumefaction, with diminished power and sensibility of the limb, may continue for a few months. When a woman has once suffered from phlegmasia dolens after parturition, great care should be taken to maintain her health during subsequent pregnancies and labors.

Pathology.—Dr. Mackenzie rejected the opinion that this disease arises from phlebitis. He believed that it is due to a vitiated state of the blood, giving rise to *irritation* of the nerves, muscles, lymphatics, lining membrane of veins, and areolar tissue of the limb; owing to which there results the tense elastic swelling, pain, loss of the power of motion, affection of the lymphatics, and obstructed condition of the veins, constituting the pathognomonic symptoms. Hence, this gentleman asserted that phlegmasia dolens is a blood disease, the affection of the veins being of secondary importance, since it is merely an effect of the disorder.* Dr. Robert Lee (in a paper published in the same volume as Dr. Mackenzie's) gives the results of his last twenty-four years' experience. His cases, he says, "prove in the most conclusive manner that inflammation of the iliac and femoral veins is the proximate cause of the disease; and that in puerperal women, the inflammation commences in the uterine branches of the hypogastric veins. It has likewise been demonstrated by morbid anatomy, that

* Medico-Chirurgical Transactions, vol. xxxvi, p. 169. London, 1853.

phlegmasia dolens is a disease which may take place in women who have never been pregnant, and in the male sex, and that, under all circumstances, the proximate cause is the same."

The latest writer on this disease is Dr. Tilbury Fox, whose essay is well deserving of careful study.* I can only give this gentleman's conclusions, which are as follow: In phlegmasia dolens both veins and lymphatics are obstructed. The obstruction may either be due simply to extrinsic pressure; or to inflammatory changes in the coats of the vessels leading to coagulation (this depends upon virus action), which except during epidemics of puerperal fever is not so common as is supposed. It being generally admitted that rapid ingress of abnormal fluid suddenly, and in large amount, will cause instantaneous coagulation of blood; and it being also allowed that large drains from the system are followed by rapid and compensatory absorption;—there is good reason for believing that these conditions are amply fulfilled, in conjunction with the presence of wound (facilitating absorption) in a great many cases, prior to the occurrence of phlegmasia dolens, and that the latter is frequently thus evolved. These different modes of evolution may be more or less conjoined.

Treatment.—Dr. David Davis, who paid much attention to this affection, recommended the local abstraction of blood by leeches, the application of blisters, the use of evaporating lotions, free and constant exposure to the action of the atmosphere, and the internal exhibition of digitalis with blue pill. Dr. R. Lee seems to place most reliance on the repeated application of leeches above and below Poupart's ligament. In the cases which have been under my own observation, the patients have invariably been in a feeble state of health, and consequently such remedies as venesection, leeches, calomel, and digitalis, have not been thought of. I have generally at first employed sedative and alkaline fomentations, perfect rest, simple diet, and opiates to relieve the pain. The fluid in which the fomentation flannels are to be wrung out is made by adding one pound of bicarbonate of soda, and one ounce of extract of poppies, to each gallon of boiling water. The flannels ought to be changed every thirty minutes; they are to be applied over the whole limb, and even over the groin and lower part of the abdomen if there be tenderness; while the heat and steam from them are to be retained by the use of impermeable cloth. At a later stage, great benefit has seemed to accrue from attempts to improve the condition of the blood; as by the use of wine, brandy, milk and raw eggs, animal food, ammonia and bark, &c. Where there has been any offensive vaginal discharge, injections of simple warm water, or of some weak disinfectant solution, have been used every night and morning.

Flying blisters and stimulating liniments to the limb, are now and then useful when all the acute symptoms have subsided; but I have found nothing answer so well as efficient bandaging. At this stage also I have seen much good from the employment of the iodide of iron, or of the chlorate of potash and bark; as well as from quinine, cod-liver oil, and temporary change of residence to the seaside.

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* Transactions of the Obstetrical Society of London, vol. ii, p. 201. London, 1861.

PART XVI.

DISEASES OF THE ABSORBENT SYSTEM.

THE absorbent or the lymphatic [*Lympha* = water] system includes the superficial and deep lymphatic vessels, the glands through which these ramify, and the lymphatics of the small intestines—the extremely delicate lacteal or chyliferous tubes. The lymphatic vessels are distributed through almost every vascular organ and tissue in the body. Their presence has not, however, been demonstrated in the brain and spinal cord; although the membranes of these nervous centres are supplied with them. The lymphatic or absorbent glands are found in the neck, axilla, front of the elbow, groin, and popliteal space; in the thorax, about the anterior and posterior mediastina; and in considerable numbers in the abdomen—in the mesentery, as well as by the side of the aorta, vena cava, and iliac vessels.

I. INFLAMMATION OF THE LYMPHATICS.

Inflammation of the lymphatic vessels, or angeioleucitis [from *Ἀγγεῖον* = a vase or vessel; *λευκὸς* = white; terminal *-itis*], may result from external injury, or from the absorption of some deleterious matter. The vessels are seldom, if ever, attacked without the glands being involved in the morbid action; though the glands occasionally become inflamed while the vessels remain healthy.

The best examples of angeioleucitis are seen in the case of punctured dissection-wounds with the absorption of corrupting animal matter; in carbuncles and abscesses, from the absorption of unhealthy pus; as well as in those accidents where the injured part assumes an erysipelatous character. The course of the inflammation is shown by the formation of bright red streaks, which run upwards from the wound in the direction of the absorbents, along the previously healthy surface, as far as the glands in which the vessels are merged; these streaks or lines being tender to the touch and hard like little cords, while they are the seat of stinging, burning pains. The glands in connection with the affected vessels quickly become involved, and get swollen and acutely painful; while the whole limb is rendered more or less puffy and tender. The constitutional disturbance is always great; there being in many instances chills or rigors, nausea and constipation, fever, prostration, restlessness, and considerable mental depression.

The inflammation will either terminate in resolution; or it may end in suppuration, with the formation of large abscesses, or with infiltration of matter around the lymphatics and ganglia; or it may pass into a chronic stage, causing induration, which will probably remain for months; or it may actually lead to fatal exhaustion, or to death from ichorrhæmia. Not unfrequently, also, inflammation of the lymphatics becomes complicated with erysipelas, or with phlebitis, or even with both.

The remedies for this affection are few, but they require to be promptly employed. Any wound which may be present should be bathed and poulticed, while the whole limb is to be assiduously fomented. Considerable relief will be afforded by freely painting the inflamed lines with extract of belladonna, or with belladonna and extract of poppies (F. 297), before applying the fomentation flannels. Care is to be taken that the air of the sick-room is pure and cool. The patient is to be abundantly supplied with refreshing drinks, or he may be allowed plenty of ice. The diet is to consist of milk and strong beef tea; while the depression which early sets in is to be combated by the administration of wine or brandy. The bowels are to be cleared out by a dose of jalap, or by stimulating enemata. Then no drug, as a general rule, proves so useful as the carbonate of ammonia; which may be given in oft-repeated doses, with bark or some bitter infusion (F. 371). When urgent typhoid symptoms, with clammy sweats and delirium, set in, care must be taken that the blood is not overcharged with ammonia (p. 205); but if it be so, the hydrochloric acid (F. 357) ought to be prescribed, while brandy is to be administered at short intervals. If suppuration, either diffused or circumscribed, take place, the pus must be evacuated by free incisions.

II. INFLAMMATION OF THE LYMPHATIC GLANDS.

Inflammation of the lymphatic glands, or adenitis [from *Ἀδήν* = a gland: terminal *-itis*], is not only an accompaniment of angeioleucitis, but it may occur independently of such an affection. Thus, in children recovering from one of the eruptive fevers, particularly scarlatina, the cervical glands are apt to become swollen and tender, the inflammation not unfrequently ending in suppuration. Again, in strumous subjects adenitis is a very common disorder; though in such the inflammation is by no means always of a simple character, being often due to the insidious deposition of tubercle in the gland.

The commencement of acute adenitis is often indicated by a feeling of malaise, followed by slight chills and symptomatic fever. Then, one or more glands become swollen, hot, hard, tender, and painful; the swelling being chiefly due to infiltration of the areolar or connective tissue of the gland. As the tumefaction increases, the skin over it becomes reddened or livid; while if the convoluted tubes get obstructed, the surrounding tissues will be rendered œdematous. Unless resolution occur, or unless the acute symptoms gradually subside into chronic inflammation, there will be suppuration in a few days; an abscess forming in the interior of the gland, or in the connective tissue which surrounds it. The latter event is not uncommon; and it may be recognized by finding that the tumor is no longer circumscribed and movable, as it remains when the pus forms only in the interior of the gland. In cases where the morbid action is chronic or suba-

cute from the commencement, or where the acute merges into the chronic form, we find induration with persistent enlargement; the pain and heat being slight, while the skin retains its natural color, and the connective tissue remains unaffected, so that the gland is movable.

Strumous enlargement and inflammation are usually chronic; the glands of the neck, and those about the base and angle of the lower jaw being more frequently affected than any others. The subjects of this form are especially young children, though it is not a rare affection of delicate adults, of such as manifest a strumous diathesis. There are no premonitory symptoms, as a rule; the first indication of the disease being a swelling of one or more glands. If the mischief increase, however, and especially if there be a tendency to suppuration, the system will suffer considerably; and the already weakened patient becomes irritable and restless, his tongue gets furred, his pulse is rendered quick and feeble, the bowels become costive, the appetite fails, while the urine will be found scanty and loaded with urates. Where the general health is very bad, the inflamed glands rapidly undergo disorganization; and the surrounding connective tissue and skin getting involved, extensive indolent ulcers result. When the lymphatic glands of the mesentery are affected with strumous inflammation, a special and often fatal form of disease is set up, which will be described in a subsequent section.

The treatment of simple acute adenitis is much the same as that required for angeioleucitis. In the strumous variety we have especially to improve the general health; and consequently such remedies as quinine and iron (F. 380), iodide of ammonium and bark (F. 38), the so-called chemical food (F. 405), and cod-liver oil, are all valuable remedies. The diet must be nourishing, with a full allowance of milk; while no treatment will be of permanent advantage unless the patient has the benefit of pure air. Local applications are of comparatively little value; but in the early stages of the inflammation water-dressing soothes the irritable glands better than poultices. If there be much pain, the application of belladonna and extract of poppies (F. 297) in combination with bread-and-water poultices, affords great relief. When the inflammatory action, however, has subsided, and the glands merely remain indurated, friction with the red iodide of mercury ointment, diluted with lard, will often produce absorption. As a rule, enlarged glands are not to be extirpated.

The nature and treatment of adenitis of a venereal origin has already (p. 272) been described. It is also unnecessary to speak here of the affections of these glands from cancerous infiltration; such disease being much more commonly a secondary than a primary formation.

III. DILATATION OF THE LYMPHATICS.

A partially hypertrophied and varicose state of the lymphatic vessels has been observed by many authors. The dilatation is sometimes congenital; or it may be due to some obstruction of the convoluted tubes in the glands; or it will have arisen from the pressure of an aneurismal or other tumor on the trunks in which the vessels terminate.

Dr. Carswell mentions the remarkable case of a young man about twenty-six years of age, who was seized with severe abdominal pains and vomiting. There was a swelling in each groin, nearly as large as an orange, and the

cause of suffering was therefore attributed to strangulated hernia. Owing to the great prostration, no operation could be attempted. After death, the only remarkable circumstance observed was enormous dilatation of the lymphatics from both groins upwards, including the thoracic duct. The two swellings in the groins, which had actually been treated as double herniæ, a truss having been worn from boyhood, were found to be produced by great dilatation of the lymphatics of the inguinal glands. As no obstacle could be detected throughout the course or at the termination of the thoracic duct to account for the dilatation of the lymphatics, it was concluded that the condition was a congenital malformation.*

Dr. Grainger Stewart has recorded the history of a man who died at the age of sixty from heart disease. On examining the small intestine, a number of whitish-yellow patches were seen, varying in size from that of a pinhead to that of a small bean, scattered throughout its coats. Some of these patches were quite granular on the surface, and evidently connected with the mucous membrane; others were smooth, rounded, and lobulated, like minute fatty tumors, and evidently lay in the submucous layer, for by a little careful dissection they could be separated from the mucous membrane on the one side, and from the muscular layer on the other; while a third set, again, much less abundant, consisted of a combination of the other two. On microscopic examination, those of the *first* kind were found to be made up of groups of villi, greatly distended, as in the process of digestion—*i. e.*, they were dark and opaque. On tearing them, a milklike fluid escaped, which presented, microscopically, the characters of milk or chyle. The villus then collapsed, and there was no appearance of the bloodvessels having been distended; wherefore it seemed obvious that the whole enlargements depended upon the presence of the milklike fluid. Those of the *second* kind resembled small fatty tumors, and were situated between the mucous and muscular coats. Some consisted of a single lobule, others of several lobules. On pricking any of them, a milklike fluid, containing aggregations of fatty granules, flowed out, and the walls of the particular lobule collapsed. Dr. Stewart also quotes a corresponding case from Rokitansky, the chief features in which were these: The body of a man, who died at the age of sixty-two, presented œdema of the subcutaneous areolar tissue, and very considerable effusion of a milklike fluid, in both the pleural and peritoneal cavities; dilatation and hypertrophy of the heart, with thickening and shortening of the mitral valves; thickening of the mucous membrane of the stomach in the pyloric half, and a white and swollen condition of the intestinal walls; while the subpleural lymphatic vessels were distended, and still more the chyle-vessels and the thoracic duct. They presented, from the bowel to the first series of lymphatic glands, knotlike dilatations, full of a white soapy or greasy-looking matter, which became diffused in water. It consisted of fatty granules, crystals of margarin, and some apparently nucleated cells. In individual places, the mass was more yellow, and adhered to the walls of the vessels. The lymphatic glands contained similar small deposits, and in the thoracic duct there were some dilatations.†

Dilatation of the lymphatics appears occasionally to lead to a rupture of their coats, in the same way that varicose veins sometimes give way. Dr. Carter's cases of chylous urine, in which there was probably a leakage from the lacteals into some part of the urinary track, have been already

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* Pathological Anatomy. Article "Hypertrophy." London, 1838.
† Edinburgh Medical Journal, p. 448. November, 1863.

referred to (p. 704). The same gentleman has also published certain facts, which appear to indicate a close connection between a varicose state of the lymphatic system and elephantiasis Arabum attacking the scrotum.*

IV. TABES MESENTERICA.

Tabes Mesenterica [*Tabes* = a consumption, from *tabeo* = to melt away: *Μεσεντέριον* = the membrane which connects the intestines together,—*μέσος*, *ἔντερον*] is the name given to a tubercular or strumous degeneration of the mesenteric glands. The disease might appropriately be termed abdominal phthisis.

To understand the *pathology* of mesenteric disease it is necessary to remember that the tubercular matter becomes effused into the glands themselves, more or less destroying their structure, and of course preventing the passage of the chyle through the convoluted lacteals which traverse them. Consequently there is impaired nutrition, varying in grade according to the extent of lymphatic obstruction. The glands are found enlarged, and affected in different degrees; in some the abnormal product being tough and almost fibrous, in others degeneration having so far advanced that it is soft and pulpy, while in a third class there is only a calcareous deposit owing to the albuminous portion having been absorbed. Mesenteric disease particularly affects infants and young children; but it is by no means as frequent as the old authors believed, who regarded every child with a swollen belly as a victim of it.

The *symptoms* which are indicative of this affection are chiefly the following: There is pain in the bowels, more or less constant and sometimes severe, causing the child to keep his legs drawn up towards his belly. The lips are of a deep-red color; and the angles of the mouth are covered with small ulcers, or the whole lip is fissured. The bowels are variable, though generally relaxed; the motions being often unhealthy, and extremely fetid. The abdomen is swollen and tense; while the other parts of the body waste away, owing to the obstruction of the chyle-ducts, until an extreme degree of emaciation exists. There is great pallor and general debility: the weakness increases very rapidly. Symptoms of pulmonary consumption may supervene, or the brain may become implicated, or the child may die worn out by the abdominal disease. Recovery does sometimes occur, however, when treatment is resorted to before the functions of the glands are much impeded. In these favorable cases the period of convalescence will be very slow, and great caution must be employed to prevent any relapse.

The *diagnosis* is not always very easy, and there are two or three disorders with which this disease is apt to be confounded. Thus, strumous infants not unfrequently suffer from very obstinate diarrhœa, as a sequela of some exhausting disease; or a looseness comes on owing to insufficient nourishment, or to the child being kept in a damp offensive atmosphere, &c. The evacuations also are not only very numerous, but unhealthy; consisting of greenish mucus, with undigested food. The countenance becomes anxious and aged; the skin is found to be harsh, the breath offensive, the tongue dry and aphthous, and the stomach irritable. More-

* Transactions of the Medical and Physical Society of Bombay. New Series, vol. vii, p. 186. Bombay, 1862.

over, the little patient is restless and very fretful. If removal of the cause, and the use of such remedies as milk and lime-water, logwood and opium, ipecacuanha and catechu, port wine or brandy, &c., fail to effect a cure, extreme exhaustion sets in, which soon ends fatally. After death the mucous membrane of the alimentary canal will be found quite normal, while the mesenteric glands may be merely swollen and congested—probably as the consequence of the irritation, although possibly as its cause.

Again, hydrocephalus in its early stages somewhat resembles strumous disease of the abdomen. But in the former the cerebral oppression is greater, sickness is more troublesome and constant, the mind is duller, there is strabismus, and the abdomen is found flattened rather than distended.

In tuberculization of the bronchial glands there is greater disturbance, at an earlier period, than when the mesenteric glands are alone diseased; owing to the fact that in enlargement of the former the air-tubes soon become compressed and their vital functions interfered with, the unyielding walls of the thorax offering a marked contrast to the flexible parietes of the abdomen. The general character of the symptoms, as well as of the pathology, is the same in both cases.

Tubercular peritonitis is hardly to be distinguished from the disease under consideration, with which indeed it is often combined (p. 669). Fortunately the distinction is unimportant.

The *treatment* of tabes mesenterica must consist in the use of mild nourishing food adapted to the child's age and strength; asses' milk, goats' milk, soda-water with milk, cream, and farinaceous preparations being very useful. Port wine and beef tea are valuable agents. Cod-liver oil will be of much service in many cases; especially when given with tonics, and sometimes with small doses of iodide of potassium and the ammonio-citrate of iron (F. 31, 32, reduced in strength according to the patient's age). In several instances I have seen great benefit from the employment of "chemical food" (F. 405); as well as from small doses of the hypophosphite of soda and bark. Raw meat, minced very fine, is not unfrequently taken greedily by children with mesenteric disease, marked improvement resulting. Where the motions are very offensive, a few small doses of mercury and chalk, combined with a grain or two of the powder of ipecacuanha and opium, or with the aromatic powder of chalk and opium, prove serviceable. Astringents to check the diarrhœa, frictions over the abdomen with the common soap or opiate liniments, hot linseed poultices to relieve any pain, warm clothing, and the employment of a flannel bandage round the body, will frequently be necessary. Care must also be taken that the air of the child's apartments is kept healthy; it being especially necessary that the sleeping-room should be of a good size and properly ventilated.

The invigorating influence of sea air is as clearly apparent in the early stages of tabes mesenterica, as it is in other forms of tuberculosis. Children who have refused both food and medicine, and who would pine and die in the unhealthy courts and narrow streets of large cities, seem to imbibe a new life with the inspiration of a pure air, loaded with saline particles. Materials which the stomach previously refused to digest, become converted into healthy chyme; the blood circulates with renewed activity through the enfeebled frame; and while nutrition becomes stimulated, the secretions from the various glands gradually appear of a more healthy character, the little patient ceases to be irritable and fretful, and the muscles lose their soft flabby feel. After a few days' residence at Margate, Broadstairs, Folkestone, Eastbourne, Brighton, Scarborough, &c., when the child is becoming acclimatized, bathing may be tried; commencing with warm

salt-water baths every morning, and gradually lowering their temperature until a healthy glow follows quickly upon the use of tepid water. As a rule, strumous children seldom derive any benefit from cold bathing; while a dip in the open sea often produces a greater shock than they can well bear. Moreover, to force a timid and delicate child into the water is a piece of cruelty to which no medical practitioner should ever give his consent.

The preceding remarks show that the great aim of treatment in mesenteric disease must be to improve and fortify the constitution. All remedies which interfere with this object, can only prove injurious. The use of salines, aperients, tartarated antimony, digitalis, calomel, mercurial liniments, and leeches, is to be condemned; for if some of such agents inflict no positive mischief, they certainly cause the loss of valuable time. Our main reliance, in short, must be placed on food which can be easily assimilated, on cod-liver oil, and on sea air.



APPENDIX OF FORMULÆ.

In prescribing a medicine, attention must be paid to the following points: Age, Sex, Temperament, Habit, Condition of System, Climate, and Season of the Year. The operation of most drugs is materially influenced by the form in which the medicine is given, the purity of the preparation, the time of day at which the dose is taken, and the condition of the stomach as regards the presence or absence of food. The succeeding formulæ are for Adults, unless the contrary is stated. The doses may, except in the case of mercurials and narcotics, be reduced by attention to this table:

For an adult, suppose the dose to be	. . .	1	or gr. 60.
Under 1 year, will require only	. . .	1-12th	or gr. 5.
" 2 years, "	. . .	1-8th	or gr. 7½.
" 3 " "	. . .	1-6th	or gr. 10.
" 4 " "	. . .	1-4th	or gr. 15.
" 7 " "	. . .	1-3d	or gr. 20.
" 14 " "	. . .	1-half	or gr. 30.
" 20 " "	. . .	2-3ds	or gr. 40.

Above 21, the full dose
" 65, the dose must be diminished in the inverse gradation of the above.

Children bear as large doses of mercury as adults; but they are much more susceptible to the influence of opiates. Consequently, opium must be given in very minute doses to them. Females, also, from their more delicate organization and greater sensitiveness, require smaller quantities of powerful medicines than males. This is particularly the case during the periods of menstruation, pregnancy, and lactation.

The skill of the physician is shown by the administration of the proper remedy, in the proper quantity, at the proper time. A druggist's apprentice can tell what agents will purge, vomit, or sweat; but a man must be practically conversant with disease to be able rightly to apply his therapeutical resources to the exigencies of any particular case. Instead of introducing medicines into the system by the stomach, it is often more advisable to do so by the rectum, or by the skin, or by the lungs, or by injection into the areolar tissue. Absorption takes place from the rectum as speedily and surely as from the stomach; and hence purgatives, emetics, narcotics, tonics, and nutrients may be admirably administered as enemata. The skin offers a mechanical impediment to absorption; but still poultices and fomentations, plasters, liniments and ointments, and medicated vapor or water baths, are all valuable remedies. If the cuticle be removed by a blister, and the medicine applied to the denuded dermis in its pure state, or incorporated with lard or mucilage, its action will be rapid. The system is quickly and thoroughly affected by the inhalation of medicated vapors, or of substances reduced to an impalpable powder. Subcutaneous injections must be employed with great caution; since by this plan none of the medicine is lost, neither is it altered or diluted by the contents of the stomach, as happens when drugs are taken by the mouth —In only exceptional cases can there be any advantage in procuring absorption through the conjunctiva, the nasal or pituitary membrane, or the mucous coat of the vagina; but in these exceptional cases the benefit is often very great.—Injection into the veins is too dangerous to allow of its being practiced except as a last resource in grave diseases,—such as epidemic cholera, &c.

The practitioner will do well to bear in mind the following rules: 1. When a disease is progressing favorably towards recovery, it is unwise to interfere with the

spontaneous effort at cure by the administration of drugs. The end and aim of treatment is not only to restore health, but to do so safely and speedily and pleasantly.—2. Where drugs are needed, and there is a choice of remedies, employ that one which will be the least distressing at the time, and subsequently the least injurious to the constitution.—3. Put the medicine into that form in which it can be most easily taken. When possible, especially with children, cover the disagreeable taste of the draught by syrups, &c —4. If there be an idiosyncrasy with respect to any special medicine, such as mercury, arsenic, iodide of potassium, opium, nux vomica, assafœtida, turpentine, &c., avoid administering it. That a peculiarity of constitution, causing an extreme susceptibility to the influence of certain drugs and foods and odors, sometimes exists, cannot be disputed. It is as certain that it can seldom be safely combated.—5. Attend to the condition under which the patient will be at the period of the medicine's action; *e. g.*, it will be worse than useless to give a sudorific to an individual obliged to be in the open air soon after taking it.—6. Be careful that the various agents in the prescription are not incompatible with each other, unless it be desired to form some new or particular compound. Chemical incompatibility, however, is by no means synonymous with therapeutical inertness: for experience tells us that certain unchemical compounds—perchloride of mercury and tincture of bark, gallic acid and tincture of opium, calomel and compound ipecacuanha powder, &c., are all valuable preparations in curing diseases.—7. Remember that if a disease be incurable, it may still admit of great alleviation. Hence it is cruel to give up any case; although, at the same time, the patient is not to be deceived by false promises.—8. Never order, or sanction the use of, a quack medicine; *i. e.*, one the composition of which is kept a secret.—9. Bearing in mind the weakness of human nature, as well as the prejudices and superstitions which are current, it is not only necessary to give good advice, but pains must be taken so to impress the patients and attendants that the necessary treatment may be thoroughly carried out. *Hope* and *confidence* are no mean remedial agents; and in many chronic diseases at least, the individual who has *faith* will recover more speedily, cæteris paribus, than he who is shy of belief.—10. Simply to prescribe drugs, without regulating the diet and general management of the patient, is to omit a most important duty. In acute diseases plain directions must be given as to the ventilation and warmth of the sick-room, the amount of light, the position of the bed (not to be placed in a corner), the degree of quiet to be maintained, the avoidance of excitement and whispering, the exclusion of visitors, the cleanliness of the sufferer, and the nature and quantity and times for administration of food. No cooking whatever should be permitted in the sick-room. In cases of long illness, when the patient can be moved without risk, it is often desirable to have two beds in the room—one to be occupied during the day, the other at night. Every precaution must be taken to prevent the spread of infectious disorders. Soiled linen, dirty water, &c., must be immediately removed. And, in all instances, the evacuations ought to be passed in a bed-pan or night-stool containing some disinfectant material (carbolic acid, permanganate of potash, sulphate of iron, &c.)—11. While it is allowed that the following formulæ may often be employed unaltered with great advantage, yet it is not supposed that they will usually be prescribed with servile exactness; for it should never be forgotten that all medicines of any power have to be adapted to the requirements of the special case under treatment. It has been quaintly but truly observed, that a bundle of ready-made receipts in the hands of the routine practitioner, is but a well-equipped quiver on the back of an unskilful archer.—And 12. In watching the restoration of a sick man to health, it is a mistake to attribute the improvement too confidently to the action of the medicine prescribed; for it may not have been taken, or it may not have been absorbed, or its properties may have been destroyed by adulteration, or it may have even proved injurious—recovery occurring in spite of it.

With regard to the manner of writing prescriptions, the physician is strongly advised to adopt a clear and distinct style, as well as to give all the directions fully in the English language. Hieroglyphics and illegible scrawls, absurd abbreviations and bad Latin, are more fit for the work of astrologers or fortune-tellers, than for that of scientific men in the present day. Such caligraphic abominations may impose upon the vulgar; but people of sense merely view them as cloaks for ignorance. Looking at the public as a body, there is not the slightest reason why each member of it, when ill, should be kept in ignorance of the nature of the remedies he is asked to take. There is nothing unreasonable in a patient being afraid of mercury, arsenic, opium, &c.; but in nineteen cases out of twenty, all fear will be banished by a straightforward explanation of the physician's reasons for prescribing such drugs. Surely he must be either a very credulous or thoughtless individual who will take a

nauseous draught, he scarce knows why; to effect, he knows not what. And this being so, ought not medical men to be the last to foster such folly? Complaint is made of the enormous consumption of patent medicines; but if the public be educated blindly to take drugs without any question as to what such medicines consist of and what they are to accomplish, who can wonder that charlatanism thrives? The most formidable opponent to all kinds of medical quackery is the physician who carefully investigates the cases of disease which come before him, and who treats his patients as sensible beings anxious to know something of the nature of their complaints and how they are to be overcome.

The succeeding formulæ have been written in accordance with the rules, preparations, &c., of the British Pharmacopœia, of 1867. For the sake of convenience they are arranged in twenty classes running thus:

1. Aliments,
2. Alteratives and Resolvents,
3. Antacids,
4. Antiseptics,
5. Antispasmodics,
6. Astringents,
7. Baths,
8. Cathartics and Anthelmintics,
9. Caustics and Counter-Irritants,
10. Diaphoretics and Diuretics,
11. Emetics and Expectorants,
12. Gargles and Inhalations,
13. Lotions, Liniments, Collyria, and Ointments,
14. Narcotics and Sedatives,
15. Refrigerants and Salines,
16. Stimulants,
17. Tonics,
18. Uterine Therapeutics,
19. Climates for Invalids,
20. Mineral Waters.

The symbolic formulæ employed here and there in these volumes, have been represented according to the new method of notation.

I. ALIMENTS.

Formula 1. Extract of Beef.

Take one pound of rumpsteak, mince it like sausage-meat, and mix it with one pint of cold water. Place it in a pot at the side of the fire to heat very slowly. It may stand two or three hours before it is allowed to simmer, and then let it boil gently for fifteen minutes. Skim and serve. The addition of a small tablespoonful of cream to a teacupful of this beef tea renders it richer and more nourishing. Sometimes it is preferred when thickened with a little flour or arrowroot.

The *Extract of Meat Lozenges*, as sold by Allen and Hanbury, can sometimes be taken when the stomach is too irritable to retain beef tea. Each lozenge contains half its weight (or about eighteen grains) of pure Extract of Meat made after Liebig's process. This quantity corresponds to the soluble constituents of an ounce and a quarter of solid flesh, and will afford the sustaining and restorative effect of soup or beef tea made from that quantity of meat.—A good broth may be made by dissolving four of these lozenges in a wineglassful of boiling water, adding a little salt and pepper to taste.

2. Restorative Soup for Invalids.

Take one pound of newly-killed beef or fowl, chop it fine, add eight fluid ounces of soft or distilled water, four or six drops of pure hydrochloric acid, 30 to 60 grs. of common salt, and stir well together. After three hours the whole is to be thrown on a conical hair sieve, and the fluid allowed to pass through with slight pressure. On the flesh residue in the sieve pour slowly two ounces of distilled water, and let it run through while squeezing the meat. There will be thus obtained about ten fluid ounces of cold juice (cold extract of flesh), of a red color, and possessing a pleasant taste of soup; of which, a wineglassful may be taken at pleasure. It must not be warmed (at least, not to a greater extent than can be effected by partially filling a bottle with it, and standing this in hot water), since it is rendered muddy by heat or by alcohol, and deposits a thick coagulum of albumen with the coloring matter of blood.—If, from any special circumstance (such as a free secretion of gas-

tric juice), it is deemed undesirable to administer an acid, the soup may be well prepared by merely soaking the minced meat in plain distilled water.—Children, and even adults, will frequently take the raw meat simply minced, when they are suffering from great debility. One teaspoonful of such meat may be given every three or four hours. If found disagreeable, all unpleasantness can be removed by thoroughly mixing in a mortar two parts of pounded white sugar with one part of meat.

This modification of Liebig's formula is very valuable in cases of continued fever, in dysentery, and indeed in all diseases attended with great prostration and weakness of the digestive organs. When the flavor is thought disagreeable, it may be concealed by the addition of spice, or of a wineglassful of claret to each teacupful of soup.

3. Essence of Beef.

Take one pound of gravy-beef free from skin and fat, chop it up as fine as mince-meat, pound it in a mortar with three tablespoonfuls of soft water, and let it soak for two hours. Then put it into a covered earthen jar with a little salt, cementing the edges of the cover with pudding-paste, and tying a piece of cloth over the top. Place the jar in a pot half full of boiling water, and keep the pot on the fire for four hours. Strain off (through a coarse sieve, so as to allow the smaller particles of meat to pass) the liquid essence, which will amount to about five or six ounces in quantity. Give two or more teaspoonfuls frequently.

In great debility, diphtheria, typhus, exhaustion from hemorrhage, &c.

4. Liebig's Food for Infants and Invalids.

Half an ounce of wheaten flour (that called "seconds" is the most suitable), an equal quantity of malt flour, 7½ grains of bicarbonate of potash, and an ounce of water, are to be well mixed. Add five ounces of cow's milk, and put the whole on a gentle fire. When the mixture begins to thicken, it is to be removed from the fire, stirred for five minutes, heated and stirred again till it becomes quite fluid, and finally made to boil. After separating the bran by passing the mixture through a sieve, it is ready for use.

To save the trouble of weighing, it may be remembered that a tablespoonful (heaped up) of wheaten flour, weighs nearly half an ounce, and a heaped dessert-spoonful of malt flour is equal to the same. This soup is as sweet as milk; and after boiling, may be kept for 24 hours without undergoing any change.—This is an excellent food for infants who cannot be suckled. It is slightly aperient; so that children under one year of age can seldom take more than two meals of it in the day. Where there is a tendency to diarrhœa, twenty grains of prepared chalk may be substituted for the potash. The proportion of blood-forming and heat-producing elements is the same as in woman's milk (1 : 3.8); while the quantity of alkali is equivalent to that in human milk.

The solid parts of this food are sold, ready mixed in packets, by Mr. Hooper, of Pallmall East and Grosvenor Street, Mr. Cooper, of 26 Oxford Street, as well as by many other chemists. Barley malt can also be procured from every brewery. It may be ground in a common coffee-mill, the coarse powder being passed through a sieve to remove the husks.

5. Eggs, Cream, and Extract of Beef.

Wash two ounces of the best pearl sago until the water poured from it is clear. Then stew the sago in half a pint of water until it is quite tender and very thick: mix with it half a pint of good boiling cream and the yolks of four fresh eggs, and mingle the whole carefully with one quart of good beef tea, which should be boiling. Serve.

This nourishing broth is very useful in many cases of lingering convalescence after acute disease.

6. Mutton or Veal Broth—Beef Tea.

Take of mutton or veal or beef one pound and a half, cold water one quart, a little salt, and rice two ounces. Simmer for four hours, boil for a few minutes, strain and serve. Another excellent plan for making beef tea is as follows: Take one pound of beef minced very fine, and put it into a common earthenware teapot, with a pint and a half of cold water. Stand the pot on the hob, so that it may simmer

for at least three hours. About three-quarters of a pint of good beef tea will be thus obtained.

Beef tea as ordinarily made, and preserved meat juice of all kinds, are palatable but not very nutritive drinks. A pint of fine beef tea contains scarcely a quarter of an ounce of anything but water. Nevertheless, if these fluids are of small value as mere nutrients, perhaps the osmazome and salts they contain may possess the property (like tea and coffee) of diminishing the waste of the tissues. It has been proved that dogs die slowly if fed on bread and gelatin alone; but when greatly reduced by this diet they soon regain flesh and strength if two ounces of meat tea be daily added to it.

Gruel mixed with beef tea is nourishing. It is made thus: Take two tablespoonfuls of oatmeal with three of cold water, and mix them thoroughly. Then add a pint of strong boiling beef tea (or of milk); boil for five minutes, stirring well to prevent the oatmeal from burning, and strain through a hair sieve.

An excellent simple restorative during convalescence from acute disease before solid food can be taken.

7. Spruce Beer.

The essence of spruce is prepared by boiling down to concentration the young branches of the Black Spruce Fir (Abies Nigra). Take of this essence half a pint; bruised pimento and ginger, of each four ounces; water three gallons. Boil for five or ten minutes; then strain, and add eleven gallons of warm water, a pint of yeast, and six pints of molasses. Mix, and allow the mixture to ferment for twenty-four hours.

It is an admirable antiscorbutic, and is an agreeable and wholesome drink in warm weather. This drink was found very efficacious by Captain Cook. Dr. Robert Barnes suggests that it should be used in the Merchant Service instead of rum, which has no antiscorbutic virtue.

8. Tapioca and Cod-Liver.

Boil a quarter of a pound of tapioca till tender, in two quarts of water; drain it in a cullender, then put it back in the pan; season with a little salt and pepper, add half a pint of milk, and put over one pound of fresh cod-liver cut in eight pieces. Set the pan near the fire to simmer slowly for half an hour, or a little more, till the liver is quite cooked. Press on it with a spoon, so as to get as much oil into the tapioca as possible. After taking away the liver, mix the tapioca. If too thick, add a little milk, then boil it a few minutes; stir round, add a little salt and pepper, and serve.—ALEXIS SOYER.

Tapioca thus cooked is nourishing and easily digested.

9. The Bran Loaf.

The formula used by Mr. Camplin, in *Diabetes*, is as follows: Take a sufficient quantity (say two or three quarts) of wheat bran, boil it in two successive waters for ten minutes, each time straining it through a sieve, then wash it well with cold water (on the sieve) until the water runs off perfectly clear; squeeze the bran in a cloth as dry as possible, then spread it thinly on a dish, and place it in a slow oven —if put in at night, let it remain until the morning, when, if perfectly dry and crisp, it will be fit for grinding. The bran thus prepared must be ground in a fine mill, and sifted through a wire sieve of sufficient fineness to require the use of a brush to pass it through: that which does not pass at first ought to be ground and sifted again, until the whole is soft and fine.

Take of this bran-powder three ounces troy, three fresh eggs, one ounce and a half of butter, and rather less than half a pint of milk; mix the eggs with part of the milk, and warm the butter with the other portion; then stir the whole well together, adding a little nutmeg and ginger, or any other agreeable spice. Immediately before putting into the oven, stir in first thirty-five grains of sesquicarbonate of soda, and then three drachms of dilute hydrochloric acid. The loaf thus prepared should be baked in a basin (previously well buttered) for about an hour or rather more.

Biscuits may be prepared as above, omitting the soda and hydrochloric acid and part of the milk, and making them of proper consistence for moulding into shape.

If properly baked, the loaves or biscuits will keep several days; but they should always be preserved in a dry place, and not be prepared in too large quantities at a time.

10. White Wine Whey.

To half a pint of boiling milk, add one or two wineglassfuls of sherry or Madeira. The curd is to be separated by straining through a fine sieve or piece of muslin. Sweeten the whey with refined sugar.

11. Caudle.

Beat up one egg with a wineglassful of sherry, and add it to half a pint of fine hot gruel. Flavor with sugar, nutmeg, and lemon-peel.

In insomnia with debility.

Beat up two tablespoonfuls of cream in a pint of thin cold gruel. Add to this one tablespoonful of curaçoa or noyeau, and a wineglassful of sherry. Flavor with sugar-candy, and let half a tumblerful be taken, cold, at intervals.

12. Ferruginous Chocolate.

Spanish chocolate, 16 oz.; carbonate of iron, half an ounce. Divide into one-ounce cakes. One to be dissolved in half a pint of hot milk, and taken night and morning.

In anæmia, amenorrhœa, &c.

13. Iceland Moss and Quinine Jelly.

Take of Iceland moss (Cetraria), and Irish moss (Chondrus crispus, Carragheen), each one ounce. Boil slowly for three-quarters of an hour in a pint and a half of milk, strain through muslin, and add three ounces of white sugar dissolved in one ounce of the compound tincture of quinia (equal to eight grains of the salt). A dessertspoonful to be taken frequently in the course of the day.

In phthisis, tabes mesenterica, &c.

14. Lime-water and Milk.

℞. Liquoris Calcis Saccharati, min. 20—90, *vel* Liquoris Calcis, fl. oz. 1—4; Lactis, fl. oz. 4. Mix.

This compound will sometimes be retained when all other food is ejected. As a variety, milk and soda-water in equal proportions, may also be ordered. (See F. 73.)

It may be well to remember that the addition of grs. 15 of Bicarbonate of Soda to the quart of fresh milk not only prevents it from turning sour for several hours, but renders it more digestible.

15. Artificial Ass's and Goat's Milk.

Take half an ounce of gelatin, and dissolve it in half a pint of hot barley-water. Then add an ounce of refined sugar, and pour into the mixture a pint of good new cow's milk.

Chop an ounce of suet (that of the calf is the best) very fine, tie it lightly in a muslin bag, and boil it slowly in a quart of new milk. Sweeten with white sugar, or a glass of any liqueur.

An excellent aliment in some cases of tabes mesenterica, &c., where the unpleasant odor of goat's milk prevents its being taken.

16. Milk, Flour, and Steel.

Beat up carefully one tablespoonful of flour, one raw egg, and about twenty grains of the saccharated carbonate of iron, with half a pint of new milk; flavor with nutmeg and white sugar. To be taken for lunch with a biscuit.

In the early stages of tuberculosis, the author has found this mixture very valuable.

17. Brandy and Egg Mixtures.

Take the whites and yolks of three eggs, and beat them up in five ounces of plain water. Add slowly three ounces of brandy, with a little sugar and nutmeg. This form is preferable to that in the British Pharmacopœia for 1867: which form con-

tains an insufficient quantity of egg, while it is spoilt for sensitive stomachs by the cinnamon-water it is mixed with. Two tablespoonfuls should be given every four or six hours. In some cases of great prostration the efficacy of the mixture is much increased by the addition of one drachm of the tincture of yellow cinchona to each dose.

When the stomach is very irritable, the following will often be useful: Take a tablespoonful of cream and beat it up thoroughly with the white of a new-laid egg. Add slowly to the frothy mixture thus obtained, one tablespoonful of brandy in which a lump of sugar has been dissolved.

18. Bread Jelly.

Take a quantity of the soft part of a loaf, break it up, cover it with boiling water, and allow it to soak for some hours. The water—containing all the noxious matters with which the bread may be adulterated—is then to be strained off completely, and fresh water added; place the mixture on the fire, and allow it to boil for some time until it becomes smooth; the water is then to be pressed out, and the bread on cooling will form a thick jelly. Mix a portion of this with sugared milk and water, for use as it is wanted.—DR. CHURCHILL.

A good food for infants at the time of weaning, for children with acute disease, &c.

19. Nutritious Demulcent Drinks.

Mix together half a pint of Mucilago Acaciæ, Mistura Amygdalæ, and pure milk; sweeten with sugar-candy or honey; and add one large tablespoonful of any liqueur. Allow the whole to be taken during the day.—Or, a large pinch of isinglass may be boiled with a tumblerful of milk, half a dozen bruised almonds, and two or three lumps of sugar. To be taken warm once or twice in the day.

These drinks are very grateful in case of tonsillitis, ulceration of the pharynx, &c.; also in some cases of debility, with irritability of the stomach, and a tendency to diarrhœa.

20. Indian Sarsaparilla and Barley-water.

℞. Syrupi Hemidesmi, fl. oz. 2; Glycerini, fl. oz. 1; Decocti Hordei, fl. oz. 9. Mix, and direct one tablespoonful to be taken frequently.

An agreeable demulcent, slightly alterative, and diaphoretic mixture. Useful in the eruptive fevers, and for inflammations of the mucous membranes.

21. Beef Tea and Cream Enemata.

An excellent nutritious enema can be made by mixing together from four to eight ounces of strong beef tea, an ounce of cream, and half an ounce of brandy or an ounce and a half of port wine. It may be administered twice or thrice in the course of twenty-four hours.

In cases of acute gastritis, carcinoma of the stomach, obstinate vomiting, &c., where it is necessary to avoid giving food by the mouth.

Another form may run thus: Take four or six ounces of restorative soup prepared without any acid (F. 2), one ounce of cream, two teaspoonfuls of brandy, and either fifteen minims of liquid extract of opium, or ten grains of citrate of iron and quinia.

22. Cod-Liver Oil and Bark Enema.

Take four ounces of milk, one ounce of port wine, half an ounce of cod-liver oil, two drachms of tincture of yellow cinchona, and twenty minims of liquid extract of opium. Mix. To be administered every twelve hours.

23. Quinine and Solution of Beef Enema.

Take one tablespoonful of brandy, five grains of sulphate of quinia, one teaspoonful of glycerin, two tablespoonfuls of cream, and from four to eight ounces of restorative soup (F. 2). Mix. This enema can be administered every six or eight hours. Where the rectum is very irritable, or it is necessary to relieve pain, from fifteen to twenty minims of the liquid extract of opium may be advantageously added.

II. ALTERATIVES AND RESOLVENTS.

24. Compound Pill of Calomel and Opium.

℞. Pilulæ Hydrargyri Subchloridi Compositæ, gr. 5; Extracti Opii, gr. ½. Make a pill, and direct it to be taken every night or night and morning.

In disorders dependent on a venereal taint.

25. Calomel and Opium.

℞. Hydrargyri Subchloridi, gr. 2; Pulveris Opii, gr. ½; Confectionis Rosæ Gallicæ, sufficient to make a pill. To be taken every four hours.

As an alterative, when it is wished to get the system quickly under the influence of mercury.

26. Mercury and Conium.

℞. Hydrargyri cum Cretâ, gr. 2; Extracti Conii, gr. 8. Mix, and form a pill to be taken three times a day.

In syphilitic tubercular diseases.

27. Perchloride of Mercury, or Corrosive Sublimate.

℞. Hydrargyri Perchloridi, gr. 1; Ammonii Chloridi, gr. 5; Extracti Sarsæ Liquidi, fl. drs. 12; Decocti Sarsæ Compositi, ad fl. oz. 12. Mix. Direct,—"Two small tablespoonfuls to be taken three times a day."

In confirmed constitutional syphilis; as well as in some forms of eczema, prurigo, follicular vaginitis, chronic metritis, &c.

℞ Hydrargyri Perchloridi, gr. 1; Glycerini, fl. oz. 1; Tincturæ Cinchonæ Compositæ, ad fl. oz. 3; Olei Menthæ Piperitæ, min. 25. Mix. Direct,—"One teaspoonful in a wineglassful of water, three times a day."

In constitutional syphilis, some forms of hemorrhage, and certain varieties of vertigo.

℞. Hydrargyri Perchloridi, gr. 1; Extracti Opii, gr. 3—6; Guaiaci Resinæ, gr. 100; Glycerini, sufficient to make a mass. Divide carefully into twenty-four pills, and order two to be taken three times a day.

In some varieties of chronic rheumatism, secondary syphilis, and skin diseases.

28. Mercury, Squills, and Digitalis.

℞. Pilulæ Hydrargyri, gr. 3; Digitalis Foliæ, gr. ½; Pulveris Scillæ, gr. 1½. Mix, and form a pill to be taken twice or three times a day.

As an alterative and diuretic, in some cases of dropsy.

29. Bromide of Mercury and Sarsaparilla.

℞. Hydrargyri Bromidi, gr. ½; Extracti Sarsæ Liquidi, fl. drs. 2; Decocti Sarsæ Compositi, fl. drs. 10. Mix. To be taken three times a day.

In syphilitic lepra and obstinate secondary syphilitic eruptions.

30. Podophyllum Peltatum, or May-apple.

℞. Podophylli Resinæ, gr. ⅛—½; Pulveris Ipecacuanhæ, gr. ½; Extracti Gentianæ, gr. 3. Mix. Make a pill, to be taken twice or thrice daily.

In syphilis, scrofula, jaundice from suppression, skin diseases, &c. As a simple alterative it is perhaps as valuable as mercury, without possessing any injurious qualities. One or two grains of quinine may be advantageously added to each pill, where there is general debility. See F. 160.

31. Iodide of Potassium Mixtures.

℞. Potassii Iodidi, gr. 20—30; Tincture Serpentariæ, fl. drs. 3; Misturæ Guaiaci, ad fl. oz. 8. Mix. One-sixth part to be taken three times a day.

Valuable in chronic and gonorrhœal rheumatism, in lumbago, some forms of neuralgia, &c.

℞. Potassii Iodidi, gr. 30; Potassæ Bicarbonatis, gr. 60; Tincturæ Hyoscyami, fl. drs. 3; Infusi Cinchonæ Flavæ, ad fl. oz. 8. Mix. One-sixth part three times a day.

In chronic rheumatism with an abundance of lithates in the urine; as well as in some cases of eczema, &c.

℞. Potassii Iodidi, gr. 2; Vini Colchici, min. 15; Tincturæ Aconiti, min. 3—8; Infusi Rhei, fl. oz. 1. Make a draught, to be taken three times a day.

In acute and suppressed and chronic gout.

℞. Potassii Iodidi, gr. 3—5; Spiritûs Ammonia Aromatici, min. 40; Tincturæ Belladonnæ, min. 5—15; Tincturæ Cinchonæ Compositæ, fl. drm. 1; Aquæ Menthæ Piperitæ, ad fl. oz. 1½. Make a draught. To be taken three times a day.

In some cases of asthma the author has found remarkable benefit from this formula.

℞. Potassii Iodidi, gr. 15—30; Vini Colchici, min. 90; Tincturæ Hyoscyami, fl. drs. 6; Magnesiæ Sulphatis, gr. 220; Infusi Anthemidis, ad fl. oz. 8. Mix. One-sixth part three times a day.

In some instances of gout with fever and constipation, and in chronic pleurisy with effusion. Also in cases of lead and mercurial poisoning occurring in gouty subjects.

℞. Potassii Iodidi, gr. 60; Tincturæ Rhei, fl. oz. 1; Extracti Sarsæ Liquidi, fl. oz. 2. Mix. Label,—"A small teaspoonful in a wineglassful of water, three times a day."

In syphilitic skin diseases, in nodes, and in follicular inflammation of the pharyngo-laryngeal mucous membrane, &c.

℞. Potassii Iodidi, gr. 30—120; Glycerini, fl. oz. 1; Tincturæ Aconiti, min. 20; Vini Ipecacuanhæ, fl. drs. 2; Succi Taraxaci, fl. drs. 6; Decocti Sarsæ Compositi, ad fl. oz. 8. Mix. One-sixth part three times a day.

In severe gonorrhœal rheumatism, tertiary syphilis, secondary spreading syphilitic ulcers, bronchocele, scrofulous sores, aneurism, &c.

℞. Potassii Iodidi, gr. 15; Tincturæ Assafœtidæ, min. 90; Tincturæ Senegæ, fl. drs. 3; Syrupi Mori, ad fl. oz. 3. Mix. Label,—"One teaspoonful every two, three, or four hours."

For a child about two years old, suffering from croup. Also in cases of infantile pneumonia.

32. Iodide of Iron Mixtures.

℞. Ferri Iodidi, gr. 6—18; Glycerini, fl. drs. 12; Infusi Calumbæ, ad fl. oz. 8. Mix. One-sixth part three times a day.

In the early stages of tuberculosis, and in strumous ulcers, where the stomach will not tolerate cod-liver oil.

℞. Potassii Iodidi, gr. 30; Ferri et Ammoniæ Citratis, gr. 60; Aquæ Destillatæ, fl. drs. 2; Glycerini, fl. drs. 6; Olei Menthæ Piperitæ, min. 10; Olei Morrhuæ, ad fl. oz. 6. Mix. One tablespoonful after the two chief meals of the day.

℞. Potassii Iodidi, gr. 12; Ferri et Quiniæ Citratis, gr. 30; Tincturæ Aconiti, min. 25; Infusi Chiratæ, fl. oz. 6. Mix. One-sixth part three times a day.

In chronic rheumatism with debility, &c.

℞. Tincturæ Ferri Perchloridi, Tincturæ Iodi, āā min. 10; Aquæ Camphoræ, fl. oz. 1. Make a draught, to be taken three times a day.

Useful in strumous affections of the cervical glands, mesenteric disease, and some cutaneous disorders.

℞. Syrupi Ferri Iodidi, Extracti Sarsæ Liquidi, āā fl. oz. 1. Mix. Direct,—"One teaspoonful in two tablespoonfuls of water three times a day."

In chronic rheumatism, old-standing venereal affections, &c.

℞. Potassii Iodidi, gr. 3—8; Ferri et Ammoniæ Citratis, gr. 20; Syrupi Papaveris, fl. drs. 3; Infusi Quassiæ, ad fl. oz. 4. Mix. One tablespoonful three times a day.

For children with tabes mesenterica. Useful also for strumous subjects who have had ascarides.

33. Iodide of Potassium and Mercury.

℞. Ammoniæ Carbonatis, gr. 30; Potassii Iodidi, gr. 20; Tincturæ Aconiti, min. 30; Tincturæ Chloroformi Compositæ, fl. drm. 1; Tincturæ Cinchonæ Flavæ, fl. drs. 6; Aquæ Menthæ Piperitæ, ad fl. oz. 8. Mix. Direct,—"One-sixth part three times a day, viz., at 9 A.M., 2 P.M., and 7 P.M." At the same time,—

℞. Hydrargyri Iodidi Viride, gr. 2; Extracti Opii, gr. 1; Extracti Hyoscyami, gr. 6. Mix, divide into two pills, and order one to be taken every night at 11 o'clock as long as the mixture is continued.

Very useful in many forms of constitutional syphilis, with sleepless nights.

34. Mercury and Chalk, with Dover's Powder, &c.

℞. Hydrargyri cum Cretâ, Pulveris Ipecacuanhæ Compositi, ãã gr. 5. Mix, and make a powder to be taken every eight or twelve hours.

In diarrhœa with unhealthy secretions, and in mild dysentery.

℞. Sodæ Bicarbonatis, Hydrargyri cum Cretâ, ãã gr. 2; Magnesiæ Carbonatis, gr. 5. Mix, and make a powder to be taken every other night.

An alterative and aperient for children, where there is great acidity of the secretions.

35. Cyanide of Mercury.

℞. Hydrargyri Cyanidi, gr. 1; Extracti Opii, gr. 4; Extracti Conii, gr. 40. Mix thoroughly, divide into sixteen pills, and order one to be taken night and morning.

For long-standing syphilitic eruptions, ulcers, sore throats, &c. A lotion or gargle can be used at the same time, made with six grains of the Cyanide of Mercury to a pint of water or of the infusion of linseed.

36. Tar Pills and Capsules.

℞. Picis Liquidæ, oz. 1; Pulveris Aromatici, oz. ½. Mix, divide into five-grain pills, and order two or three to be taken three times a day.

TAR CAPSULES are made, each containing about six grains of tar. Two or three may be taken for each dose, thrice daily.

In some chronic skin diseases, eczema, pruritus of the anus, and chronic catarrhal affections.

37. Bromide of Ammonium.

℞. Ammonii Bromidi, gr. 12—60; Infusi Aurantii, fl. oz. 8. Mix. Direct,—"One-sixth part to be taken three times a day, an hour before meals."

Recommended by Sir G. D. Gibb for diseases in which the nervous system is functionally involved, as epilepsy, &c. It is a valuable absorbent in glandular enlargements, and in excessive corpulency; while it has also a peculiar soothing influence upon the mucous membranes.

℞. Ammonii Bromidi, gr. 24; Aquæ, fl. oz. 2. Mix. One teaspoonful in a small cup of sweetened tea three times a day.

For an infant with hooping-cough.

38. Iodide of Ammonium.

℞. Ammonii Iodidi, gr. 3—15; Infusi Cinchonæ Flavæ fl. oz. 1—2. Make a draught. To be taken twice or thrice daily before food.

Very valuable in strumous enlargement of the absorbent glands. The dose is to be graduated according to the patient's age. At the time this medicine is given internally, an ointment of the iodide of ammonium (gr. 60 to lard oz. 1) should be rubbed into the swellings night and morning.

39. Iodide of Sodium.

℞. Sodii Iodidi, gr. 60; Decocti Sarsæ Compositi, fl. oz. 8. Mix. One-sixth part three times a day.

As an antisyphilitic where the iodide of potassium disagrees. Moreover, it will sometimes effect a cure after the latter has failed to be of use.

40. Benzoate of Ammonia.

℞. Ammoniæ Benzoatis, gr. 10—20; Syrupi Aurantii Floris, fl. drm. 1; Aquæ, ad fl. drs. 12. Mix for a draught, to be taken three times a day.

In chronic bronchitis, hepatic congestion, with deficient urine, chronic inflammation of the bladder with alkaline urine, and in cases attended with the copious excretion of phosphates.

41. Creasote.

℞. Creasoti, min. 20—40; Pulveris Aromatici, gr. 80; Mucilaginis Acaciæ, sufficient to form a mass. Divide into twenty pills, and order one or two to be taken three times a day.

In some forms of neuralgia, chronic bronchitis, and obstinate vomiting, unconnected with inflammation or organic disease, such as sea-sickness. After taking creasote for a short time, the urine occasionally assumes a dirty or brownish-black color. Inunction with tar may give rise to the same effect. Under these circumstances, creasote has been obtained from the urine by distillation.

In the officinal MISTURA CREASOTI, the unpleasant flavor is tolerably well disguised by the Spirit of Juniper. Dose of the mixture, fl. oz. 1—2. See F. 90.

42. Bromide of Potassium.

℞. Potassii Bromidi, gr. 20—40; Aquæ Camphoræ, fl. oz. 8. Mix for a draught, to be taken every night, at bedtime.

For insomnia, without any apparent cause, epileptic and epileptoid seizures, paroxysmal vertigo, and headache, &c.

℞. Potassii Bromidi, gr. 60—90; Potassii Iodidi. gr. 12; Potassæ Bicarbonatis, gr. 40; Tincturæ Aurantii, fl. drs. 6; Infusi Aurantii Compositi, ad fl. oz. 8. Mix. One-sixth part on an empty stomach, night and morning.

The favorite remedy for epilepsy (1865).

℞. Potassii Bromidi, gr. 30—60; Tincturæ Valerianæ Ammoniatæ, fl. drs. 6; Aquæ Camphoræ, vel Infusi Chiratæ, ad fl. oz. 8. Mix. One-sixth part three times a day.

In hysteria, insomnia, due to nervous irritability, functional disturbance of the uterine functions, spermatorrhœa, from bad habits, &c.

℞. Pulveris Guaiaci, gr. 40; Potassii Bromidi, gr. 30; Magnesiæ Carbonatis, gr. 60. Mix. Divide into six powders, and order one to be taken three times a day in a little mucilage, or cream, or honey.

Useful in cases where it is required to exert a sedative action on the sexual organs.

43. Guaiacum Mixtures.

℞. Tincturæ Guaiaci Ammoniatæ, fl. drs. 4; Tincturæ Aconiti, min. 30; Mucilaginis Tragacanthæ, Aqua Cinnamomi, ää fl. oz. 4. Mix. Two tablespoonfuls twice or three times a day.

In the chronic rheumatism of old and weak people. Also in some skin diseases, where there is a strumous taint.

℞. Extracti Opii Liquidii, min. 30; Tincturæ Quiniæ, fl. drs. 6; Misturæ Guaiaci, ad fl. oz 8. Mix. One-sixth part three times a day.

In chronic skin diseases. Guaiacum has also been highly extolled in tonsillitis.

℞. Sulphuris Sublimati, oz. 2; Potassæ Tartratis Acidæ, oz. 1; Pulveris Rhei, gr. 120; Guaiaci Resinæ, gr. 60; Mellis, lb. 1; Myristicæ, unum in pulverem redacti. Mix thoroughly, and order two teaspoonfuls to be taken night and morning, until the whole is consumed.

This compound was formerly in much repute for the cure of chronic rheumatism; being said to be especially useful in old-standing cases, when the skin is inactive and the intestinal glands, &c., torpid. It is well known under the name of the "Chelsea Pensioner."

44. Quinine and Ipecacuanha, or Belladonna.

℞. Quiniæ Sulphatis, gr. 8; Pulveris Ipecacuanhæ, gr. 24; Pulveris Ipecacuanhæ Compositi, gr. 30; Glycerini, sufficient to form a mass. Divide into sixteen pills, and order two to be taken every three or four hours.

In subacute dysentery, occurring in tropical regions. See F. 384.

℞. Quiniæ Sulphatis, gr. 2; Extracti Belladonnæ, gr. ½; Extracti Opii, gr. ½—1; Extracti Hyoscyami, gr. 2. Make a pill, to be taken every six or eight hours.

In neuralgia, severe pruritus of the vulva, carcinoma, &c. See F. 383.

45. Chloride of Calcium, &c.

℞. Calcii Chloridi, gr. 200; Tincturæ Belladonnæ, fl. drs. 4; Tincturæ Aurantii, fl. drs. 12; Aquæ, fl. oz. 1. Mix and label,—"One teaspoonful in a wineglassful of water three times a day, at 10 A.M., 4 P.M., and bedtime."

In fibroid tumors of the uterus, when they are painful or cause much sense of weight and backache. Also, in bronchocele, enlargement of cervical glands, scrofula, &c.

46. Colchicum, &c.

℞. Hydrargyri Subchloridi, Extracti Colchici Acetici, Extracti Aloes Barbadensis, Pulveris Ipecacuanhæ, āā gr. 1. Make a pill, to be taken every four hours, until the bowels are well acted upon.

In gout, with congestion of the liver.

℞. Extracti Colchici Acetici, Extracti Aconiti, āā gr. 1; Pilulæ Hydrargyri, gr. 3. Make a pill, to be taken every night at bedtime.

In gout, with deficient action of the liver.

℞. Potassæ Citratis, gr. 120; Vini Colchici, fl. drs. 1—2; Liquoris Morphiæ Hydrochloratis, fl. drm. 1; Aquæ Camphoræ, ad fl. oz. 8. Mix. One-sixth part every six hours.

In some forms of gout, where there is great restlessness with but little constitutional depression.

℞. Spiritûs Ammoniæ Aromatici, fl. drs. 6; Vini Colchici, fl. drs. 2—4; Tincturæ Aurantii, ad fl. oz. 2. Mix. Direct,—"One teaspoonful in half a bottle of soda-water, three times a day."

47. Oxide of Silver.

℞. Argenti Oxidi, gr. 1—2; Pulveris Aromatici, gr. 2; Extracti Cannabis Indicæ, gr. ½; Glycerini, sufficient to make a pill. To be taken three times a day.

Of doubtful efficacy in dyspepsia, pyrosis, hæmoptysis, menorrhagia, diarrhœa, &c. One-third of a grain of Extract of Opium can be added to each pill, if needed.

48. Sulphurous Acid.

℞. Acidi Sulphurosi, min. 30—fl. drm. 1; Aquæ, ad fl. oz. 2. Mix for a draught, to be taken every two or three or four hours.

In ichorrhæmia, diphtheria, malignant scarlet fever, typhus, &c.

℞. Sodæ Sulphitis, gr. 30—60; Infusi Quassiæ, fl. oz. 1½. Mix, and make a draught, to be taken three times a day.—SIR WILLIAM JENNER.

In diseases of the stomach, accompanied by the formation of the sarcinæ ventriculi. The patient should eat unfermented bread while taking this medicine.

The SULPHITE OF MAGNESIA may be given in doses varying from 20 to 40 grains, dissolved in one or two ounces of water, every two or three or four hours, with the object of neutralizing blood poisons. It is richer in sulphurous acid than the sulphite of soda, is more stable, and has a much more agreeable taste. This salt has been strongly recommended by Dr. Polli, of Milan, in cases of pyæmia, typhus, puerperal fever, hospital gangrene, dissecting wounds, glanders, cholera, &c.

49. Benzoic Acid.

℞. Acidi Benzoici, gr. 3—20; Glycerini, sufficient to form one or more pills.

Administered in proper doses, three or four times a day, this remedy is useful in jaundice from suppressed action of the liver, and uræmia. It has also been recommended in some cases of incontinence of urine in children. See F. 246.

50. Turpentine Mixtures.

℞. Olei Terebinthinæ, fl. oz. 1; Vitelli Unius Ovi; beat together and add gradually Misturæ Amygdalæ, fl. oz. 4; Syrupi Aurantii, fl. oz. 2; Tincturæ Lavandulæ Compositæ, fl. drs. 4; Olei Cinnamomi, guttæ 4. Mix. Two tablespoonfuls to be taken three times a day.—CARMICHAEL.

Recommended in iritis, where the use of mercury is contraindicated.

℞. Spiritûs Ætheris, fl. drs. 2; Olei Terebinthinæ, fl. drs. 1½; Mucilaginis Acaciæ, fl. oz 3; Aquæ Cinnamomi, ad fl. oz. 6. Mix. Direct,—"One-sixth part three times a day."

To prevent the formation of gallstones, or to aid in dissolving them. The utility of this mixture is doubtful.

℞. Olei Terebinthinæ, fl. drs. 1½—3; Syrupi Limonis, fl. drs. 6. Mucilaginis Tragacanthæ, fl. oz. 3; Aquæ, ad fl. oz. 6. Mix. Direct,—"One-sixth part every four or six hours."

Useful in some forms of hæmatemesis, hæmoptysis, epistaxis, purpura hæmorrhagica, &c. Its effects must be watched, so that it may be discontinued directly any unpleasant results—such as strangury or severe vomiting—arise. If the symptoms are very urgent the first dose of the turpentine may consist of fl. drs. 4—6, beaten up with mucilage; the succeeding doses being according to the formula. In some cases the turpentine may be advantageously given with gallic acid, or the tincture of the perchloride of iron, or with the acid infusion of roses, or with the dilute nitric acid. A drop of creasote with each dose materially lessens its tendency to cause nausea.

℞. Terebinthinæ Chiæ, gr. 2; Pulveris Rhei, gr. 3; Saponis duri, sufficient to make a pill. To be taken twice a day. See F. 102.

51. Donovan's Triple Solution.

℞. Liquoris Hydriodatis Arsenici et Hydrargyri, min. 20—30; Tincturæ Zingiberis, fl. drm. 1; Aquæ, fl. oz. 1. Make a draught, to be taken twice a day, directly after meals.

Useful in secondary syphilis, psoriasis, &c.

52. Arsenical Mixtures.

℞. Liquoris Arsenicalis, min. 3; Tincturæ Lupuli, min. 30; Infusi Quassiæ, fl. oz. 1. Make a draught, to be taken three times a day, directly after meals.

Very useful in many obstinate cutaneous diseases. In ague the quantity of arsenic must be trebled. Under any circumstances, the dose should be diminished directly the tongue gets thoroughly coated with a silvery-looking fur, or the conjunctivæ become irritable, or diarrhœa sets in, or gastric pain is complained of.

℞. Liquoris Sodæ Arseniatis, min. 3—5; Vini Colchici, min. 10; Tincturæ Cinchonæ Compositæ, fl. drm. 1; Tincturæ Aconiti, min. 5; Aquæ, ad fl. oz. 1. Mix. To be taken three times a day, directly after meals.

In some forms of chronic rheumatism, &c.

℞. Quiniæ Sulphatis, gr. 20; Liquoris Arsenici Hydrochlorici, min. 90—130; Acidi Sulphurici Aromatici, fl. drs. 2; Syrupi Zingiberis, ad fl. oz. 3. Mix. Label, "One teaspoonful in two tablespoonfuls of water directly after breakfast, dinner, and tea."

In severe neuralgia, chorea, chronic rheumatism, asthma, hay fever, and intermittent fever. See F. 381, 399.

In psoriasis, chronic eczema, and other cases where it is desirable arsenic in a solid form.

℞. Acidi Arseniosi, gr. 4; Aquæ Destillatæ, fl. oz. 1. Mix. Thi subcutaneous injection. The best plan is to begin with an injection, three minims; after the fourth day the injection may be repeated twice after the twelfth day the strength of each injection can be increased t

In psoriasis and other skin diseases, ague, &c.

53. Green Iodide of Mercury.

℞. Hydrargyri Iodidi Viride, gr. 12; Extracti Lupuli, gr 60; Ext 2—5. Mix. Divide into twenty-four pills, silver them, and order on three or four times in the day.

The green iodide of mercury (Syn. IODIDE OF MERCURY, HgI) will the pustular and tubercular diseases of the skin, as well as certain secon ulcerations, when all other means fail. See F. 33.

℞. Hydrargyri Iodidi Viride, gr. 6; Extract Conii, gr. 30. Mix. six pills, and order one to be taken every night at bedtime.

In small secondary syphilitic ulcers about the tongue.

54. Red Iodide of Mercury.

℞. Hydrargyri Iodidi Rubri, gr. 2—3; Morphiæ Hydrochloratis, gr. Gentianæ, *vel* Extracti Conii, gr. 40. Mix. Divide into twelve pills, a to be taken twice a day. A couple of ounces of the Compound Decocti parilla may be taken with each pill, or an ounce of the Guaiac Mixtur

Useful in the same cases as demand the green iodide of mercury. Th (Syn. BINIODIDE OF MERCURY, HgI_2) is, however, less likely to cause tation.

℞. Hydrargyri Perchloridi, gr. 1; Ammonii Chloridi. gr. 30; Potass 40; Extracti Sarsæ Liquidi, fl. oz. 1; Decocti Sarsæ, ad fl. oz. 8. Mix "One small tablespoonful (or one-sixteenth part) in a wineglassful of times a day."

This formula gives a convenient extemporaneous mode of exhibit iodide of mercury in a fluid form.

℞. Hydrargyri Iodidi Rubri, gr. 3; Potassii Iodidi, gr. 60—120; S Rectificati, fl. drm. 1; Syrupi Zingiberis, fl. drs. 4; Aquæ Destillata Mix. Label,—"Thirty drops three times a day in a wineglassful of w

Mr. Langston Parker says—and the author can confirm the remark remedy, used in conjunction with the mercurial vapor-bath, produc results in some obstinate forms of tubercular disease of the skin; a

56. Puccoon and Iodide of Arsenic.

℞. Sanguinariæ Canadensis, gr. 12; Arsenici Iodidi, gr. 2; Extracti Conii, gr. 40. Mix carefully, divide into twenty-four pills, and order one to be taken three times a day.

Said to be beneficial in cases of cancer.

57. Chloride of Bromium.

℞ Bromidi Chloridi, guttæ 3—4; Pulveris Glycyrrhizæ, gr. 60. Mix intimately, and divide into twenty pills. One to be taken twice or thrice daily.

Recommended by Landolfi in cancer.

58. Bael and Spirit of Chloroform.

℞. Extracti Belæ Liquidi, fl. oz. 2; Spiritûs Chloroformi, fl. oz. 1. Mix. Direct, "One teaspoonful in a cup of barley-water three or four times a day."

Has been found useful in diarrhœa and dysentery.

59. Nitrate of Silver.

℞. Argenti Nitratis, gr 1; Extracti Hyoscyami, gr. 3. Make a pill. To be taken every twelve hours, on an empty stomach, for about ten days.

In cases of idiopathic jaundice dependent upon gastro-duodenal disturbance rather than on disease of the liver.

℞. Argenti Nitratis, gr. 3—12; Micæ panis, gr. 30. Divide into twelve pills, and order one to be taken three times a day.

In progressive locomotor ataxy, &c. See F. 419.

The gums should be watched, as the gingival mucous membrane becomes discolored before the skin is affected. There is consequently time to prevent the latter by discontinuing the silver salt.

60. Chloride of Ammonium.

℞. Ammonii Chloridi, gr. 80—160; Syrupi Hemidesmi, fl. oz. 1; Infusi Gentianæ Compositi, ad fl. oz. 8. Mix. Two tablespoonfuls every six hours.

In some forms of chronic rheumatism, chronic bronchitis, pleurodynia, myalgia, neuralgia, &c.

℞. Liquoris Ammoniæ Acetatis, fl. drs. 2—4; Ammonii Chloridi, gr. 15; Infusi Dulcamaræ, fl. oz. 2. Make a draught, to be taken every four hours.

In some varieties of rheumatism, phlegmasia dolens, thrombosis, &c., where the fibrin of the blood is in excess. The efficacy of this remedy is increased by giving 120 or 200 grains of the Acid Tartrate of Potash (Syn. BITARTRATE OF POTASH) in half a pint of water, early in the morning.

℞. Ammonii Chloridi, gr. 20; Extracti Taraxaci, gr. 15; Tincturæ Gentianæ Compositæ, fl. dr. 1; Infusi Sennæ, ad fl. oz. 2. Make a draught, to be taken twice or thrice daily.

In some cases of ascites dependent on cirrhosis, in jaundice, in diminished secretion of bile, &c.

61. Chlorate of Potash.

℞. Potassæ Chloratis, gr. 120; Aquæ Camphoræ, *vel* Infusi Cinchonæ Flava, fl. oz. 8. Mix. One-sixth part every four or six hours, with two tablespoonfuls of water.

In inflammatory affections of the mouth, &c.

℞. Potassæ Chloratis, gr. 90; Spiritûs Ætheris, fl. drs 3; Infusi Chiratæ, ad fl. oz. 4. Direct,—"One tablespoonful in a wineglassful of water three times a day."

In tonsillitis, glossitis, &c.

℞. Potassæ Chloratis, gr. 120. Label,—"This powder to be dissolved in one or two pints of lemonade, or of barley-water, to form a day's drink."

In cases of aphthæ, fever, blood-poisoning, sloughing of any of the tissues, ovarian disease, &c.

III. ANTACIDS.

62. Carbonate of Magnesia

℞. Magnesiæ Carbonatis, gr. 80; Extracti Opii Liquidi, min. 30; Spiritûs Æthe-ris, fl. drs. 3; Aquæ Menthæ Viridis, ad fl. oz. 6. Mix. One-fourth part occasionally.

Useful where there is much oppression from flatulence.

℞. Magnesiæ Carbonatis, Sodæ Bicarbonatis, āā gr. 15; Infusi Serpentariæ, fl. drs. 12. Make a draught, to be taken twice or thrice daily.

In chronic urticaria.

63. Ammonia and Chiretta.

℞. Ammoniæ Carbonatis, gr. 5; Tincturæ Aurantii, fl. drm. 1; Infusi Chiratæ, fl. oz. 1; Aquæ, ad fl. oz. 2. Make a draught, to be taken night and morning.

A good remedy in dyspepsia, with acid eructations and debility.

64. Preparations of Lithia.

℞. Lithiæ Carbonatis, gr. 8—6; Aquæ, fl. oz. 3. Make a draught, to be taken twice a day.

Dr. Garrod speaks highly of this remedy in cases of the uric acid diathesis, and in chronic gout. Where uric acid gravel is being voided, it causes a marked improvement. The carbonate of lithia exists in many of the Continental springs—as those of Carlsbad, Marienbad, Kreuznach, Aix-la-Chapelle, Kissingen, Ems, Vichy, Baden-Baden, &c.

℞. Lithiæ Citratis, gr. 60; Aquæ Destillatæ, fl. drs. 10; Tincturæ Cardamomi Compositæ, fl. drs. 2. Mix and label,—"One teaspoonful in a tumblerful of soda-water every morning before breakfast."

In the gouty diathesis. To ward off attacks.

℞. Lithiæ Citratis, Magnesiæ Carbonatis, āā gr. 10. Make a powder, to be taken twice daily.

In chronic gout.

65. Bismuth, with Magnesia or Soda.

℞. Bismuthi Carbonatis, Magnesiæ Carbonatis, āā gr. 10. Make a powder, to be taken in half a bottle of soda-water three times a day.

℞. Bismuthi Subnitratis, gr. 15; Sodæ Bicarbonatis, gr. 12; Pulveris Tragacanthæ Compositi, gr. 60. Make a powder, to be taken twice or thrice in the twenty-four hours, in a wineglassful of brandy and water.

℞. Liquoris Bismuthi et Ammoniæ Citratis, fl. drm. 1; Infusi Quassia, fl. oz. 1. Make a draught, to be taken three times a day. One drachm of the solution of bismuth is equal to twenty grains of the powder.

These preparations are very useful in pyrosis, gastrodynia, acid eructations, nausea and sickness, and many diseases of the stomach, cæcum, &c. See also F. 112.

℞. Bismuthi Subnitratis, gr. 720; Magnesiæ Carbonatis, oz. 2; Calcis Carbonatis Præcipitati, oz. 8; Sodæ Bicarbonatis, gr. 1800: Sacchari Albi, oz. 14; Acaciæ Gummi, gr. 220; Mucilaginis Acaciæ, fl. oz. 1; Aquæ Rosæ, sufficient to make a mass. Divide into 360 lozenges, and dry them with a moderate heat.

Each lozenge contains two grains of subnitrate of bismuth, two and a half grains of magnesia, and five grains of bicarbonate of soda. From one to six lozenges may be taken for a dose. These lozenges, under the name of *Trochisci Sodæ Bicarbonatis c. Bismuthum*, have been prepared for the author by Mr. Cooper, 26 Oxford Street, London. They check heartburn and acrid eructations better than the officinal bismuth lozenges.

66. Chalk Mixture and Hops.

℞. Tincturæ Lupuli, fl. drs. 6; Tincturæ Cardamomi Compositæ, fl. drs. 4; Vini Ipecacuanhæ, fl. drs. 2; Extracti Opii Liquidi, min. 25; Misturæ Cretæ, ad fl. oz. 6. Mix. One tablespoonful every three or four hours.

In diarrhœa due to acidity of the primæ viæ.

67. Potash and Ammonia.

℞. Potassæ Bicarbonatis, gr. 120; Spiritûs Ammoniæ Aromatici, fl. drs. 3; Tincturæ Aconiti, min. 30; Infusi Lupuli, ad fl. oz. 8. Mix. One-sixth part three times a day.

In gastrodynia.

68. Ammonia, Potash, and Bark.

℞. Ammoniæ Carbonatis, gr. 30; Potassæ Chloratis, gr. 90; Extracti Opii Liquidi, min. 30; Decocti Cinchonæ Flavæ, fl. oz. 8. Mix. One-sixth part three times a day.

In debility with acid secretions.

69. Solution of Potash and Buchu.

℞. Liquoris Potassæ, min. 10—15; Tincturæ Hyoscyami, min. 40; Infusi Buchu, fl. drs. 12. Make a draught, to be taken three times a day.

In catarrh and irritability of the bladder.

70. Soda, Morphia, and Dilute Hydrocyanic Acid.

℞. Sodæ Bicarbonatis, gr. 15; Liquoris Morphiæ Hydrochloratis, min 15; Acidi Hydrocyanici Diluti, min. 5; Infusi Cascarillæ, fl. oz. 1. Make a draught, to be taken immediately.

In gastrodynia, &c., after the stomach has been emptied by an emetic. In angina pectoris, immediately after a paroxysm.

71. Potash and Aloes.

℞. Potassæ Bicarbonatis, oz. ½; Tincturæ Chiratæ, fl. drs. 2; Decocti Aloes Compositi, fl. oz. 8. Mix. Take one-sixth part early every morning.

In chronic gout.

72. Bicarbonate of Potash.

℞. Potassæ Bicarbonatis, gr. 30; Aquæ, fl. oz. 2. Make a draught, to be taken every two hours.

In acute rheumatism. This medicine to be continued until the joints are free from pain. It generally renders the urine alkaline in twenty-four hours.

73. Potash and Lime-water.

℞. Liquoris Potassæ, min. 15—45; Liquoris Calcis Saccharati, min. 20—60. Mix. To be taken in a cupful of beef tea, or of milk, two or three times a day. See F. 14.

IV. ANTISEPTICS.

74. Disinfectants or Deodorants.

The most useful agents are—chloride of lime, quicklime, the carbolates of lime and magnesia, and permanganate of potash. In certain cases the perchloride of iron, sulphate of iron, ammonia, iodine, bromine, nitrate of lead, and chloride of zinc are applicable; or chlorine gas; or sulphurous acid gas (obtained by sprinkling powdered sulphur on a few bright red coals in a shovel, or by burning part of a stick of sulphur in a crucible or in a pipkin), may be employed; or powdered charcoal, or dry earth, can be tried.

No nightstools or bedpans should be used, especially in hospitals, without their containing the solution of permanganate of potash, or some chloride of lime, or chloride of zinc, or carbolic acid, or half an ounce of tincture of iodine. The first agent has the advantage of not being corrosive; but the last is one of the most efficacious. To remove quickly any unpleasant smell from the sick-room, dried lavender

or cascarilla bark may be burnt; while the door and window must be opened, so as to allow of a free current of pure air.

To disinfect linen and washing apparel they should be soaked in a mixture of two ounces of the solution of permanganate of potash to the gallon of water, being afterwards put into boiling water. Woollens, bedding, or clothing may be thoroughly purified by exposing them for about two hours, in an oven, to a temperature of 220° F.

75. Chlorine Gas.

As a fumigating agent, antiseptic, and disinfectant, chlorine stands unrivalled. The ingredients for producing it should be contained in saucers placed in the higher parts of the room, as the gas which is developed will descend by its density, and soon become mixed with the surrounding air. Dr. Faraday adopted the following method at the Millbank Penitentiary: One part of common salt was intimately mixed with one part of the black or binoxide of manganese, and placed in a shallow earthen pan; two parts of oil of vitriol previously diluted with two parts by measure of water, were then poured over it, and the whole stirred with a stick. Chlorine continued to be liberated from this mixture for four days.

Another plan for causing the free evolution of chlorine gas is the addition of half a pint of hydrochloric acid mixed with a quarter of a pint of water, to a quarter of a pound of finely powdered black oxide of manganese. Or the gas may be generated by dropping a few grains of chlorate of potash, every now and then, into a glass containing some strong hydrochloric acid. Whichever mode is adopted for producing this disinfectant, it is necessary while employing it that the doors, windows, and chimney of the room be kept carefully closed for some hours.

The Chlorides of Lime and Soda, when exposed to the air, gradually absorb carbonic acid and give off chlorine. Hence, either of these salts can be used as disinfecting agents. Cloths, dipped in an aqueous solution of chloride of lime, may be hung up in an inhabited room to fumigate it; the quantity of chlorine given off being too small to be mischievous. It was probably in reference to these salts that Abernethy said of disinfectants: "They are sometimes very useful; very useful indeed; for they make such an abominable stink that the patient is obliged to have the windows opened."

76. Solution of Chlorinated Soda.

℞. Liquoris Sodæ Chloratæ, min. 40—120; Extracti Opii Liquidi, min. 30; Aquæ Camphoræ, ad fl. oz. 8. Mix. Two tablespoonfuls three times a day.

In gangrene of the lung, low fever, &c. It not only relieves the fetor, but acts as an alterative, &c. If necessary, the opium can be omitted.

77. To prepare Chlorine for Internal Administration.

Put sixty grains of finely-powdered chlorate of potash in a strong pint bottle, and pour upon them two drachms of strong hydrochloric acid. Close the mouth of the bottle until the violent action ceases, when gently add one ounce of water, and agitate well; add another ounce, again shake, and continue this process until the bottle is full. Afterwards keep the bottle in the dark. The mixture is to be made fresh every day. One or two tablespoonfuls may be taken frequently according to the age. An adult may use the whole pint in the twenty-four hours.

The dose of the officinal LIQUOR CHLORI is from min. 30 to fl. drs. 2 in a wineglassful of water several times daily.

Useful in scarlet fever, typhus, diphtheria, chronic affections of the liver, &c.

78. Permanganate of Potash.

The permanganate of potash is an excellent disinfectant, and is the basis of Condy's Antiseptic Fluid. The latter is double the strength of the officinal LIQUOR POTASSÆ PERMANGANATIS.

From fl. drs. 1—6 of the solution of permanganate of potash in one pint of water may be applied to all kinds of suppurating sores. The author has frequently ordered such a lotion with great benefit to destroy the horribly offensive odor of a malignant ulcer; or for the same purpose in suppurating scalds and burns. The solution should

be made only of such a strength as to be borne without any pain or even uneasiness. It must be frequently syringed over the sores, since contact with lint and sponges decomposes it. Linen is stained by it, but the discoloration may be removed by sulphate of iron. As a wash for stinking feet, or for the removal of offensive odors from the hands after handling morbid specimens, &c., the liquor ought to be used in the proportion of one fluid drachm to the ounce of distilled water. As an injection in cancer of the uterus, the strength ought not to be greater than half a fluid ounce to one pint of water. To deprive night-chairs of offensive odor, a wineglassful of Condy's fluid should be mixed with two pints of fresh or salt water, and put into the pan previous to its use.

79. Chloride of Zinc.

This substance is a most powerful caustic, which has long been used to destroy cancerous and other growths. It has been administered internally—dose, gr. 1, largely diluted—but without any benefit. It forms, however, a valuable disinfectant gargle—gr. 10 to water fl. oz. 8; or in still larger proportions it is a most efficacious antiseptic. Sir W. Burnett's Disinfecting Fluid consists of gr. 25 of this salt to water fl. drm. 1. For use, about one ounce of this solution is added to two pints of water. To disinfect a sick-room, a piece of flannel three or four feet square is to be moistened with a solution thus made, and frequently waved through the air. Some of it should also be placed in the close-stools and bedpans.

80. Chlorinated Lime Lozenges.

℞. Calcis Chloratæ, gr. 60; Sacchari Albi, oz. 4; Amyli, oz. 1; Olei Menthæ Piperitæ, fl. drm. 1; Pulveris Tragacanthæ Compositi, gr. 120; Aquæ Menthæ Piperitæ, sufficient to form a mass. To be divided into lozenges of twenty grains each.

One may be taken frequently to remove fetor of the breath, whether due to mercury or other causes. The officinal TROCHISCI POTASSÆ CHLORATIS can also be used for the same purpose.

81. Iodine.

This agent has been recommended for disinfecting and deodorizing purposes by Wynn Williams, Campbell de Morgan, Nunn, and Richardson. Two hundred grains are placed in a common chip-box and suspended over the patient's bed, or they may be put into a cup or saucer on the mantel-shelf. If desired, the metal may be at once volatilized and the vapor diffused through the apartment, by placing it on a heated fire-shovel. In rooms occupied by small-pox patients the air may be kept free from smell by using iodine in this manner,—probably the strongest proof which could be adduced of the value of this simple and manageable remedy.

℞. Tincturæ Iodi, fl. drs. 6; Aquæ Destillatæ, ad fl. oz. 8. Mix.

Useful as a lotion to unhealthy ulcerations with offensive discharges.

82. Extract of Logwood.

℞. Extracti Hæmatoxyli, oz. 1; Olei Theobromæ, Adipis Benzoati, āā oz. ½. Mix.

This is an excellent disinfectant when applied to malignant sores or suppurating wounds. The remedy is equally efficacious when used as a lotion or powder. If any hæmostatic be needed, the logwood may be combined with tannin or perchloride of iron.

83. Sulphurous Acid and Quinine.

℞. Acidi Sulphurosi, fl. drs. 6; Tincturæ Aurantii, fl. oz. 1; Tincturæ Chloroformi Compositæ, min. 90; Quiniæ Sulphatis, gr. 12—18; Aquæ ad fl. oz. 6. Mix and label,—"One-sixth part, with two tablespoonfuls of water, every six or eight hours."

In pyæmia, erysipelas, glanders, typhus, dissecting-wounds, &c.

84. Lavender and Camphor.

℞. Spiritûs Camphoræ, min. 20; Spiritûs Lavandulæ, fl. drm. 1; Mucilaginis Tragacanthæ, fl. drs. 7. Make a draught.

To be taken every six or eight hours by a nervous attendant in a sick-room. Its efficacy may be increased by the occasional addition of a glass of port wine.

V. ANTISPASMODICS.

85. Ether Mixtures.

℞. Spiritûs Ætheris, min. 40–fl. drm. 1; Extracti Opii Liquidi, min. 10—15; Tincturæ Castorei, fl. drm. 1; Aquæ Menthæ Piperitæ, ad fl. drs. 12. Make a draught.

To be taken occasionally (especially at bedtime) when there are paroxysms of pain from structural disease.

℞. Spiritûs Ætheris, Spiritûs Chloroformi, ãã fl. drs. 3; Tincturæ Cardamomi Compositæ, fl. drs. 6; Spiritûs Myristicæ, fl. drs. 2; Olei Caruï, min. 12; Mucilaginis Tragacanthæ, fl. oz. 3; Aquæ Menthæ Piperitæ, ad fl. oz. 8. Mix. Two or three tablespoonfuls occasionally, when there is great oppression from flatulence.

℞. Spiritûs Ætheris, min. 90; Spiritûs Ammoniæ Aromatici, fl. drs. 2; Tincturæ Belladonnæ, min. 30; Tincturæ Cantharidis, min. 80; Tincturæ Chloroformi Compositæ, min. 40; Aquæ Camphoræ, ad fl. oz. 4. Mix. Label,—"Two tablespoonfuls every half hour, until the pain is relieved."

In spasmodic diseases, angina pectoris, &c.

86. Ammonia Mixtures.

℞. Spiritûs Ammoniæ Aromatici, fl. drm. 1; Acidi Hydrocyanici Diluti, min. 3—5; Syrupi Zingiberis, fl. drm. 1; Aquæ Caruï, ad fl. drs. 12. Make a draught. To be taken twice or thrice a day if there be flatulence or languor.

In dyspepsia, or debility with irritable stomach. See F. 67, 68.

℞. Tincturæ Assafœtidæ, fl. drs. 2; Ammoniæ Carbonatis, gr. 20; Aquæ Camphoræ, ad fl. oz. 4. Mix. One or two tablespoonfuls occasionally, when the patient is feeling languid or hysterical.

℞. Spiritûs Ammoniæ Aromatici, min. 30; Magnesiæ Carbonatis, gr. 20; Spiritûs Chloroformi, fl. drm. 1; Aquæ Menthæ Piperitæ, ad fl. drs. 12. Make a draught. To be taken occasionally.

In severe colic.

℞. Spiritûs Ammoniæ Aromatici, min. 75; Spiritûs Ætheris, fl. drm. 1; Tincturæ Belladonnæ, min. 12; Acidi Hydrocyanici Diluti, min. 8; Syrupi, ad fl. oz. 2. Mix. One teaspoonful in the same quantity of water every four hours.

For a child two years old with hooping-cough.

87. Valerian Draught.

℞. Tincturæ Valerianæ Ammoniatæ, min. 40; Infusi Valerianæ, fl. oz. 1. Make a draught. To be taken occasionally.

In hysteria.

88. Lobelia, Ether, &c.

℞. Tincturæ Lobeliæ Æthereæ, fl. drs. 3; Vini Ipecacuanhæ, fl. drs. 2; Misturæ Ammoniaci, ad fl. oz. 6. Mix. Two tablespoonfuls every six hours.

In the dyspnœa of asthma, when there is vesicular emphysema.

89. Assafœtida and Chiretta.

℞. Tincturæ Assafœtidæ, fl. drs. 2; Spiritûs Ammoniæ Aromatici, fl. dr. 3; Tincturæ Chiratæ, fl. drs. 7. Mix. Direct,—"Sixty drops in a wineglassful of water every two or three hours, until the paroxysms cease."

In hysteria.

90. Aconite and Creasote.

℞. Tincturæ Aconiti, min. 45; Misturæ Creasoti, ad fl. oz. 8. Mix. One-sixth part three times a day.

In some cases of obstinate sickness, such as occurs during pregnancy and in hysteria. See F. 41.

91. Nitric Acid Mixture.

℞. Acidi Nitrici Diluti, fl. drs 12; Tincturæ Cardamomi Compositæ, fl. drs. 8; Syrupi, fl. oz. 3½; Aquæ, fl. oz. 1. Mix. One or two small teaspoonfuls every two hours.

Sir G. D. Gibb states that nitric acid is a specific in the treatment of hooping-cough, curing the disease in from two to fifteen days. He recommends this formula.

92. Sulphate of Zinc and Belladonna.

℞. Zinci Sulphatis, gr. 8; Extracti Belladonnæ, gr. 2; Aquæ, fl. oz. 4. Mix. Half an ounce four times a day.—DR. FULLER.

For a child above three years of age with hooping-cough. Every other day the strength of the mixture may be augmented in the proportion of one dose. The belladonna, it is said, can be thus gradually increased to doses of five grains without any mischief. See F. 326.

93. Valerianate of Quinia.

℞. Quiniæ Valerianatis, gr. 12—20; Extracti Gentianæ, gr. 40. Divide into twelve pills, silver them, and order one to be taken three times a day.

In hysteria, and analogous nervous disorders.

94. Stramonium, Colchicum, and Digitalis.

R. Potassæ Citratis, gr. 120; Tincturæ Stramonii, fl. drm. 1; Tincturæ Colchici Seminis, fl. drs. 2; Infusi Digitalis, fl. oz. 2; Aquæ Menthæ Piperitæ, ad fl. oz. 8. Mix. One-sixth part three times a day.

In irregular gout, with dyspnœa or violent palpitation, and a full pulse.

95. Sumbul and Ether.

℞. Sumbulii Radicis, gr. 240; Spiritûs Ætheris, fl. oz. 4. Macerate in a stoppered bottle for seven days, and then filter. Dose, min. 20—30.

In neuralgia, hysterical fits, &c.

VI. ASTRINGENTS.

96. Rhatany Mixtures.

℞. Tincturæ Rhei, fl. drs. 3; Infusi Krameriæ, fl. oz. 8. Make a mixture, and order one-sixth part to be taken every six or eight hours.

A valuable astringent in common diarrhœa.

℞. Extracti Krameriæ, gr. 20; Aquæ, fl. drs. 12. Make a draught, to be taken three times a day.

In hæmaturia, passive intestinal hemorrhage, &c.

℞. Potassæ Chloratis, gr. 60; Tincturæ Krameriæ, fl. drs. 6; Aquæ, ad fl. oz. 8. Mix. One-sixth part three times a day.

In relaxation of the buccal mucous membrane, elongation of the uvula, sponginess of the gums, &c.

97. Catechu Mixtures.

℞. Tincturæ Catechu, fl. drs. 3—6; Pulveris Cretæ Aromatici, gr. 90; Olei Menthæ Piperitæ, min. 6; Extracti Opii Liquidi, min. 30; Misturæ Cretæ, ad fl. oz. 8. Mix. One-sixth part after every relaxed motion.

Efficacious in checking simple diarrhœa. In some instances half an ounce of castor oil should be given four hours before commencing this mixture.

℞. Tincturæ Catechu, fl. drm. 1; Acidi Sulphurici Aromatici, min. 15; Olei Menthæ Piperitæ, min. 1; Infusi Catechu, fl. oz. 1. Mix. To be taken two or three times a day.

℞. Tincturæ Catechu, fl. drs. 3; Spiritûs Chloroformi, fl. drs. 6; Extracti Belæ Liquidi, fl. drs. 12; Infusi Maticæ, ad fl. oz. 6. Mix. Two tablespoonfuls to be taken three or four times a day.
In chronic diarrhœa and dysentery.

℞. Pulveris Catechu Compositi, gr. 30; Pulveris Cretæ Aromatici cum Opio, gr. 20. Make a powder; to be taken night and morning.

98. Vegetable Charcoal.

℞. Carbonis Ligni, Theriacæ, ää oz. 1. Mix. Direct one teaspoonful to be taken three or four times a day.
In some cases of chronic diarrhœa, when the irritation is kept up by fecal fermentation. In fetid eructations. The charcoal should be recently prepared. Charcoal biscuits are also useful.

99. Tannin and Nitric Acid.

℞. Acidi Tannici, gr. 30; Acidi Nitrici Diluti, fl. drm. 1; Tincturæ Lupuli, fl. drs. 4; Infusi Gentianæ, ad fl. oz. 8. Mix. Direct,—"One-sixth part three times a day."
To restrain secretion in chronic bronchial catarrh, in phthisis when the cavities are large and the walls throw out considerable quantities of purulent matter, in nervous debility, and in most cases where an astringent is required. When a ferruginous tonic is indicated, the above mixture may be given night and morning, and some preparation of steel in the middle of the day.

100. Aromatic Sulphuric Acid and Opium.

℞. Acidi Sulphurici Aromatici, fl. drs. 2; Tincturæ Camphoræ Compositæ, fl. oz. 1; Aquæ Cinnamomi, ad fl. oz. 8. Mix. Label,—"One-sixth part three times a day, about an hour before each meal."

101. Perchloride of Iron.

℞. Tincturæ Ferri Perchloridi, min. 15; Acidi Hydrochlorici Diluti, min. 10; Aquæ Aurantii Floris, fl. drs. 12. Make a draught, to be taken every six hours.
In some cases of epistaxis, hemorrhage from the stomach, &c.

102. Oil of Turpentine.

℞. Olei Terebinthinæ, min. 10—20; Misturæ Amygdalæ, fl. oz. 1. Make a draught, to be taken every hour.
In severe hæmoptysis, especially where the individual is weak and cachectic.

℞. Mucilaginis Acaciæ, fl. drs. 4; Sodæ Bicarbonatis, gr. 10; Olei Terebinthinæ, min. 10; Olei Anethi, min. 1; Aquæ Destillatæ, ad fl. drs. 12. Make a draught; to be taken thrice daily.
In passive hæmatemesis. See F. 50.

103. Gallic Acid.

℞. Acidi Gallici, gr. 10—15; Aquæ Destillatæ, fl. drs. 12. Make a draught, to be taken every four hours.

℞. Acidi Gallici, gr. 4; Extracti Cannabis Indicæ, gr. ½; Confectionis Rosæ Gallicæ, gr. 1. Make a pill, to be taken every night at bedtime.
To check the night-sweats in phthisis.

℞. Acidi Gallici, gr. 8; Morphiæ Hydrochloratis, gr. ¼; Confectionis Rosæ Gallicæ, sufficient to make two pills. Label,—"To be taken every night at bedtime."
To relieve the cough and night-sweats of phthisis.

℞. Glycerini Acidi Gallici. fl. drs. 6—10; Acidi Sulphurici Diluti, fl. drs. 2; Extracti Ergotæ Liquidi, fl. drs. 3; Aquæ Cinnamomi, ad fl. oz. 8. Mix and label,—"One-eighth part every four or six hours."

In uterine hemorrhage, whether due to cancer, polypus, simple ulceration, or a flabby condition of the walls.

℞. Acidi Gallici, gr. 15—25; Acidi Sulphurici Aromatici, min. 15—20; Tincturæ Cinnamomi, fl. drs. 2; Aquæ Destillatæ, ad fl. oz. 2. Make a draught, to be taken every four hours until the bleeding ceases.

In profuse menorrhagia, hæmoptysis, hæmatemesis, &c.

℞. Acidi Gallici, gr. 12; Pulveris Ipecacuanhæ Compositi, gr. 5. Make a powder. To be taken every eight or twelve hours.

A valuable astringent in hemorrhage from the lungs, stomach, intestines, or kidneys.

104. Cinnamon Mixtures.

℞. Tincturæ Cinnamomi, fl. drs. 6; Acidi Nitrici Diluti, fl. drs. 2. Mix, and label,—"Thirty drops in a wineglassful of water every two hours."

Useful in passive hemorrhages from the kidneys, bladder, uterus, &c.

℞. Tincturæ Cinnamomi, fl. drs. 4; Spiritûs Ammoniæ Aromatici, fl. drs. 2; Decocti Hæmatoxyli, ad fl. oz. 6. Mix. One-fourth part after every relaxed motion.

℞. Tincturæ Cinnamomi, fl. drs. 2; Aquæ Cinnamomi, fl. oz. 1. Make a draught. To be taken thrice daily.

In menorrhagia especially, but also in other varieties of passive hemorrhage. See a paper by the author, Lancet, October 15th, 1853.

105. Matico and Rhatany.

℞. Tincturæ Krameriæ, fl. drs. 12; Syrupi Papaveris, fl. drs. 6; Infusi Maticæ, ad fl. oz. 8. Mix. One tablespoonful every three or four hours.

In the diarrhœa of tubercular phthisis.

106. Sulphate of Copper and Opium.

℞. Cupri Sulphatis, Extracti Opii, āā gr. ½; Extracti Gentianæ, gr. 8. Make a pill. To be taken three or four times a day.

In obstinate diarrhœa.

107. Nitrate of Silver and Opium.

℞. Argenti Nitratis, gr. ½; Extracti Opii, gr. 2. Make a pill. To be taken night and morning.

In very obstinate diarrhœa, where opium agrees with the system. See F. 59.

108. Kino and Logwood.

℞. Tincturæ Kino, fl. drs. 6; Vini Ipecacuanhæ, fl. drs. 2; Decocti Hæmatoxyli, ad fl. oz. 8. Mix. One-sixth part three times a day.

In chronic dysentery, diarrhœa, abundant secretion of mucus from lining membrane of colon and rectum, &c.

109. Cascarilla and Squills.

℞. Tincturæ Scillæ, fl. drs. 1½—2; Acidi Sulphurici Aromatici, fl. drm. 1; Liquoris Morphiæ Hydrochloratis, min. 30; Infusi Cascarillæ, ad fl. oz. 8. Mix. One-sixth part three times a day.

In chronic bronchitis, with profuse expectoration.

110. Alum and Syrup of Red Poppy.

℞. Aluminis, gr. 30; Syrupi Rhœados, fl. drs. 3: Aquæ, ad fl. oz. 2. Mix. One teaspoonful every two or three hours.

In the catarrh of infants, where the secretion from the bronchial tubes is excessive.

111. Oxide of Zinc.

℞. Zinci Oxidi, gr. 12; Extracti Conii, vel Hyoscyami, gr. 18. Make a mass, divide into six pills, and order one to be taken every night, at bedtime.

For the relief of night-sweats in phthisis and other exhausting diseases, there are few remedies more serviceable than the foregoing.

℞. Zinci Oxidi, gr. 2: Morphiæ Hydrochloratis, gr. ½; Extracti Anthemidis, gr. 3. Make a pill, to be taken night and morning.

112. Preparations of Bismuth.

℞. Bismuthi Carbonatis, gr. 60; Syrupi Papaveris, fl. drs. 4; Mucilaginis Tragacanthæ, fl. oz. 4; Aquæ, ad fl. oz. 8. Mix. One-sixth part every six or eight hours.

Useful in checking the diarrhœa of phthisis, typhoid fever, &c.

℞. Bismuthi Carbonatis, gr. 80; Pulveris Kino Compositi, gr. 30; Tincturæ Cinnamomi, fl. drs. 3; Mucilaginis Tragacanthæ, fl. oz. 4; Aquæ, ad fl. oz. 6. Mix. One-sixth part every four hours.

℞. Bismuthi Subnitratis, gr. 100. Divide into six powders, and order one to be taken every night, at bedtime, in a teacupful of milk arrowroot, with one tablespoonful of brandy.

In all cases where the use of bismuth is indicated with a stimulant. See F. 65.

113. Astringent Enemata.

℞. Olei Terebinthinæ, min. 30; Tincturæ Kino, fl. drs. 2; Extracti Opii Liquidi, min. 10—25; Mucilaginis Amyli, fl. oz. 2. Make an enema.

To check the purging in typhoid fever. It may be employed twice or thrice in the twenty-four hours, if necessary.

℞. Bismuthi Subnitratis, gr. 20; Tincturæ Catechu, fl. drm. 1; Liquoris Morphiæ Hydrochloratis, min. 30; Mucilaginis Amyli, fl. oz. 2. Mix for an enema.

To check the purging of phthisis, fever, &c. It may be administered every twelve hours.

114. Chloroform, Opium, and Castor Oil.

℞. Chloroformi, min. 6—12; Tincturæ Camphoræ Compositæ, fl. drs. 2; Olei Ricini, fl. drs. 3; Mucilaginis Tragacanthæ, fl. drs. 3. Make a draught, to be taken immediately.

In choleraic diarrhœa.

115. Alum and Sulphuric Acid.

℞. Aluminis, gr. 100; Syrupi Rhœados, fl. drs. 6; Infusi Rosæ Acidi, ad fl. oz. 8. Mix. Two tablespoonfuls every six hours.

In passive hemorrhage. Also, in some cases of lead colic.

116. Ammonia Iron-Alum, &c.

℞. Ferri Ammonio-Sulphatis, gr. 30—60; Aquæ Destillatæ, fl. oz. 8. Mix. One-sixth part every six or eight hours.

An excellent astringent in some forms of hæmatemesis, hæmoptysis, &c.

℞. Aluminis, gr. 90; Ferri Sulphatis, gr. 20; Quiniæ Sulphatis, gr. 4; Acidi Sulphurici Diluti, fl. drm. 1; Syrupi Limonis, fl. oz. 1; Aquæ Destillatæ, ad fl. oz. 8. Mix and label,—"One-eighth part to be taken three times a day, after food, in a wineglassful of water."

117. Lead and Acetic Acid.

℞. Plumbi Acetatis, gr. 5—10; Extracti Opii, gr. ½—1; Confectionis Rosæ Gallicæ, sufficient to make two pills. To be taken every two or three hours with the following draught: ℞. Acidi Acetici Diluti, fl. drs. 2; Aquæ Cinnamomi, fl. drs. 6. Mix.

In severe hæmoptysis.—The acetate of lead is inferior to gallic acid as an astringent, unless given in larger doses than are commonly employed. According to the authors' experience, this lead salt may be prescribed in 5, 10, or even 20 gr. doses, with great advantage, in cases of uterine hemorrhage, requiring prompt suppression. As doses of 10 grains, repeated every four hours for forty-eight or sixty hours, have given rise to attacks of colic, the author has not ventured on the large quantities (60 to 180 grs.) recommended by Dr. C. K. Irwin.

118. Cold as a Local Astringent.

The best and cheapest freezing mixture is made with ice and common salt in equal parts. Any of the following, however, will prove useful:

MIXTURES.	PARTS.	THERM. SINKS.
Chloride of Ammonium,	5	From 50° to 10° Fahr.
Nitre,	5	
Water,	10	
Nitrate of Ammonia,	1	From 50° to 4° Fahr.
Water,	1	
Snow,	2	From 32° to —4° Fahr.
Common Salt,	1	
Snow, or Ice,	12	From 18° to —25° Fahr.
Common Salt,	5	
Nitrate of Ammonia,	5	

VII. BATHS.

119. Temperature of Simple Baths.

BATH.	WATER.	VAPOR.	AIR.
The Cold,	33° to 65° Fahr.		
" Cool,	65° to 75°		
" Temperate,	75° to 85°		
" Tepid,	85° to 92°	90° to 100°	96° to 106°
" Warm,	92° to 98°	100° to 115°	106° to 120°
" Hot,	98° to 112°	115° to 140°	120° to 180°

120. Nitro-Hydrochloric Acid Baths.

℞. Acidi Nitrici, fl. drs. 12; Acidi Hydrochlorici, fl. oz. 1—3; Aquæ Calidæ, C 30. Mix. To be prepared in a wooden bath. The patient should remain in it from ten to twenty minutes.

Useful in cases where the liver is inactive,—as in invalids from tropical climates.

℞. Acidi Nitrici, fl. drs. 4; Acidi Hydrochlorici, fl. oz. 1; Aquæ Calidæ, C. 4. Mix. For a foot-bath.

In dyspepsia, with derangement of the liver and constipation. To be used in a wooden or earthenware vessel.

121. Alkaline Bath.

℞. Sodæ Carbonatis, lb. 1; Aquæ Ferventis, C. 30. Mix.

In the lithic acid diathesis, chronic squamous diseases of the skin, chronic rheumatism, &c.

122. Conium and Starch Bath.

℞. Extracti Conii, oz. 1; Pulveris Amyli, lb. 1; Aquæ Ferventis, C. 30. Mix, for a bath.

In certain skin diseases, attended with abundant scurf itching. A simple starch bath without any conium is very soothing to the skin when covered with an irritating rash.



℞. Potassæ Sulphuratæ, oz. 4; Aquæ Calidæ, C. 30. Mix.
Useful in scabies, lead colic, paralysis from lead, &c.

℞. Potassæ Sulphuratæ, oz. 4; Sodæ Hyposulphitæ, oz. 1; Acidi S drm. 1; Aquæ Calidæ, C. 30. Mix.

126. Iron, or Oak Bark, Baths.

℞. Ferri Sulphatis, oz. ½; Aquæ, C. 4. Mix.
Especially useful for strumous and rickety children.

℞. Quercûs Contusæ, lb. 1; Aquæ Calidæ, O. 2. Mix. Boil for ½ and add the strained decoction to three gallons of warm or tepid water every morning.
For delicate children, &c.

127. Salt-water Baths.

℞. Salis Marini (vulgo, "Bay Salt"), lb. ½; Aquæ Tepidæ, C. 4. a sponge-bath, to be used every morning.
In general debility, chronic rheumatism, &c. The surface of the bo thoroughly rubbed with a flesh-brush and coarse towels.

℞. Salis Marini, lb. 2; Magnesiæ Sulphatis, oz. 3; Potassii Iodidi, quoris Calcis Chloratæ, fl. oz. 1½; Aquæ, C. 30. Mix.

128. Arsenical Baths.

℞. Sodæ Carbonatis, oz. 4; Sodæ Arseniatis, gr. 20—36; Aquæ C Mix.
In rheumatoid arthritis, skin diseases, &c.

℞. Sodii Chloridi, oz. 1; Sodæ Sulphatis, oz. 1; Sodæ Carbonatis, Arseniatis, gr. 52; Aquæ Calidæ, C. 30. Mix.

℞. Potassæ Sulphuratæ, oz. 4; Sodæ Arseniatis, gr. 30—40; Aqu 30. Mix.

129. Borax Bath.

℞. Boracis, oz. 4; Glycerini, fl. oz. 8; Aquæ Calidæ, C. 30. Mix.
In some squamous and other irritable diseases of the skin.

130. The Turkish Bath

blood, and in imparting a sense of elasticity and vigor to the system. Hence it may be recommended in dropsy due to renal or hepatic disease, in gout and rheumatism, in many cutaneous affections, in albuminuria, in certain forms of neuralgia, in some cases of obesity, and so on. It is *injurious* when there is any obstruction to the circulation, or when the heart or vessels are affected with fatty degeneration, or when there are any symptoms of disease of the nervous centres, or when there is a tendency to vertigo or syncope, as well as in advanced life. Women who are pregnant, or who are menstruating, ought not to have recourse to it.

131. Mercurial Vapor Bath.

The patient is seated on a chair, and covered with an oil-cloth lined with flannel, which is supported by a proper framework. Under the chair are placed a copper bath containing water, and a metallic plate on which is put from sixty to one hundred and eighty grains of the bisulphuret of mercury, or the same quantity of the gray oxide, or of the red oxide of this metal. In syphilitic affections of the skin, testes, and bones, from five to thirty grains of the green iodide of mercury may be employed; or a mixture of twenty grains of the green iodide with ninety grains of the bisulphuret often proves efficacious. Under the bath and plate, spirit-lamps are lighted. The patient is thus exposed to the influence of three agents,—heated air, steam, and the vapor of mercury. At the end of five to ten minutes perspiration commences, which becomes excessive in ten or fifteen minutes longer. The lamps are now to be extinguished; and when the patient has become moderately cool, he is to be rubbed dry. He should then drink a cup of warm decoction of guaiacum or sarsaparilla, and repose for a short time.—LANGSTON PARKER.

In constitutional syphilis when mercury is indicated. This method of introducing mercury into the system may also be adopted with benefit in other diseases, in place of administering the metal by the mouth.

Mr. Henry Lee's mode of proceeding is more simple, and is the one which the author has frequently adopted with great success. A convenient apparatus is used, made by most instrument makers, consisting of a kind of tin case containing a spirit-lamp. In the centre, over the flame, is a small tin plate, upon which from fifteen to thirty grains of calomel are placed: while around this is a sort of saucer filled with boiling water. The lamp having been lighted, the apparatus is placed under a common cane-bottom chair, upon which the patient sits. He is then enveloped, chair and all, in one or more large blankets; and so he remains well covered up, for about twenty minutes, when the water and mercury will be found to have disappeared. About five minutes afterwards he may put on his shirt and go to bed; but it is better not to use a towel, since it can only be disadvantageous to wipe off the calomel deposited on the skin.

132. Gelatin Bath.

Take of Gelatin, or Common Glue, lb. 1; dissolve in a little boiling water, and then add twenty gallons of hot water to form a bath. This bath can ofttimes be made more efficacious by soaking in it one or two pounds of bran confined in a muslin bag.

In eczema, and other irritable cutaneous affections.

133. Mustard Foot-bath.

℞ Pulveris Sinapis, oz 2—4; Aquæ Calidæ, C. 4. Mix, for a footbath.

In congestions of the head and chest, headache, languid circulation, as well as in some cases of amenorrhœa, &c.

134. Cold Affusion.

The patient is seated in an empty bath, and from four to six buckets of cold water (about 40° Fahr.) are poured over his head and chest from a height of two or more feet. He is then quickly dried, and replaced in bed. The colder the water and the greater the height from which it is poured, the more stimulating the effect. Affusion, as thus practiced by Dr. Currie, proved very valuable in the treatment of typhus. It may be resorted to when the temperature of the body is permanently above its normal (about 98.4° Fahr.) standard, when there is no feeling of chilliness, when the body is not wholly bathed in sweat, when there is not much irrita-

bility of the nervous system, and when there is great stupor. The effect is to lower the temperature, to lessen the frequency of the pulse and respiration, to render the tongue moist and soft, to diminish or remove the stupor, to procure sleep, and sometimes to produce a critical perspiration. Cold affusion can seldom be resorted to with safety more than once in every twenty-four hours.

When it is desirable to apply a *douche-bath* to one or more of the joints it is only necessary to affix two or three yards of large-sized Indian-rubber tubing to the tap of a cistern. The patient must sit in an empty bath, into which the water may fall as it plays upon the limb. The reaction is greater after the use of hot and cold douches alternately, than after the employment of water of only one temperature.

135. The Shallow Bath.

The patient sits in a bath some six feet long, with a depth of water (temperature 60° to 80° Fahr.) varying from eight to twelve inches. The extremities and trunk are well rubbed by an assistant, while water is gently poured over the head. The duration of the bath ought to vary from five minutes to three-quarters of an hour, until the temperature of the body is lowered. The colder the water and the shorter the stay in it, the more stimulating and less sedative will be the effect. This bath is less exciting than the cold affusion, and is chiefly indicated where the latter would be improper,—*i.e.*, where there is much nervous irritability. It is also better for women, who can seldom bear the cold affusion.

As a substitute for the shallow bath the *dripping-sheet* is sometimes used. The patient stands upright in an empty bath, while the attendant, placed at his back, suddenly envelops him in a sheet dipped into cold water. The surface of the body is rapidly rubbed by the servant's flat hands for some three minutes, until the bather is in a glow; when a dry sheet is quickly substituted for the wet one, and the rubbing continued. The whole process should be over in five or six minutes.

136. Wet-sheet Packing, &c.

The patient is closely enveloped in a sheet which has been dipped in cold or tepid water and well wrung out. Or a long towel is wrung out of tepid water and applied along the whole length of the back, while another, similarly prepared, is laid over the chest and abdomen. In either case the patient is then carefully wrapped in a blanket, covered with three or more blankets, and has a down coverlet tucked over all. He should remain thus for thirty, forty-five, or sixty minutes, lying on his side, or in a semi-recumbent position; the duration being timed by the sedative effect produced. The sweating is not generally excessive. But the water, urea, and chloride of sodium of the urine are slightly increased; this increase being considerable when the sheet is continued for four hours. At the conclusion the shallow bath may be used for two or three minutes, as a tonic.

A *blanket-bath* affords an easy means of inducing sweating. A blanket is wrung out of hot water, and wrapped round the patient. He is to be packed in three or four dry blankets, and allowed to repose for thirty minutes. The surface of the body should then be well rubbed with warm towels, and the patient made comfortable in bed.

The *wet compress* consists merely of a roll of flannel or calico, dipped in cold water and wrung out, and then applied around the seat of pain. Over this a piece of waterproof cloth is worn. The compress is kept on night and day.

137. The Warm Bath as a Cooling Agent.

The warm bath at a temperature of 95° Fahr. must prove a cooling agent to the body of a fever patient at 100° or 105°. The immersion should continue from fifteen minutes to an hour or longer. Its sedative effects render it valuable where the nervous system is irritable.

In cases of delirium tremens with high fever, *cold superfusion* may be used while the patient is held in the warm bath. From ten to thirty buckets of cold water are to be poured slowly over the head; hot water being continually added to the bath to maintain its heat at 95°. This treatment may frequently be counted upon to produce sound sleep.

138. Acid Sponging.

One part of vinegar is to be added to two or three parts of cold water, and the body well sponged with the mixture. Simple tepid water may sometimes be advantageously used. The patient being weak and unable to move, the sponging must be done by degrees,—*i. e.*, the arms, chest, back, and legs are to be rapidly washed and dried.

In many cases of fever, inflammation, scarlatina, &c.

VIII. CATHARTICS AND ANTHELMINTICS.

139. The Common Black Draught.

℞. Magnesiæ Sulphatis, gr. 120; Mannæ, gr. 160; Tincturæ Sennæ, fl. drs. 2; Infusi Sennæ, ad fl. drs. 12. Make a draught. To be taken early in the morning. One ounce and a half of the officinal COMPOUND MIXTURE OF SENNA is equivalent to the foregoing.

140. Calomel, Jalap, and Epsom Salts.

℞. Hydrargyri Subchloridi, gr. 5; Pulveris Jalapæ, gr. 15. Make a powder. To be taken immediately; with the following draught three hours afterwards:

℞. Magnesiæ Sulphatis, gr. 120; Mannæ, gr. 60; Tincturæ Jalapæ, fl. drs. 2; Aquæ Carui, ad fl. drs. 12. Mix.

A good active purgative in head affections, &c., as well as at the commencement of many acute diseases.

141. The White Mixture of Hospitals.

℞. Magnesiæ Sulphatis, oz. 1½; Magnesiæ Carbonatis, gr. 120; Aquæ Menthæ Piperitæ, fl. oz. 8. Mix. The addition of two fluid drachms of Colchicum wine is sometimes advantageous. One-sixth part early every morning.

142. Epsom Salts and Sulphuric Acid.

℞. Magnesiæ Sulphatis, oz. 2; Acidi Sulphurici Aromatici, min. 90; Tincturæ Hyoscyami, fl. drs. 6; Infusi Quassiæ, ad fl. oz. 8. Mix. One-sixth part two or three times a day.

In painter's colic, copper colic, &c.

℞. Magnesiæ Sulphatis, oz. ½; Infusi Rosæ Acidi, fl. oz. 2. Make a draught. To be taken early in the morning.

In mild febrile affections with much constipation.

143. Glauber's Salts and Sulphuric Acid.

℞. Sodæ Sulphatis, gr. 120; Ferri Sulphatis, gr. 8; Acidi Sulphurici Diluti, min. 15; Tincturæ Hyoscyami, min. 40; Infusi Calumbæ, fl. oz. 2. Make a draught. To be taken the first thing in the morning.

In obstinate constipation with debility. Also in some varieties of hemorrhage where an aperient is needed,—such as purpura, hæmatemesis, &c.

℞. Sodæ Sulphatis, gr. 240; Acidi Sulphurici Diluti, fl. drm. 1; Infusi Gentianæ Compositi, fl. oz. 6. Mix. Three tablespoonfuls to be taken daily, after luncheon or dinner.

In habitual constipation with flatulence.

144. Glauber's Salts and Taraxacum.

℞. Sodæ Sulphatis, gr. 120; Succi Taraxaci, fl. drm. 1; Decocti Taraxaci, fl. oz. 2. Make a draught. To be taken every morning before breakfast.

In constipation with deficient secretion of bile. The taraxacum is a good vehicle for the sulphate of soda, even if it is incapable of influencing the secretion of bile. See F. 148.

145. Aloes, Senna, and Jalap.

℞. Tincturæ Sennæ, Tincturæ Jalapæ, āā fl. drs. 2; Infusi Sennæ, fl. oz. 2; Decocti Aloes Compositi, ad fl. oz. 8. Mix. Two tablespoonfuls to be taken night and morning.

146. Rhubarb, Gentian, and Senna.

℞. Tincturæ Rhei, fl. drs. 2; Spiritûs Ammoniæ Aromatici, min. 40; Infusi Gentianæ Compositi, Infusi Sennæ, āā fl. drs. 7. Make a draught. To be taken every morning an hour before breakfast.

A mild aperient in gouty dyspepsia.

147. Nitric Acid, Senna, and Taraxacum.

℞. Acidi Nitrici Diluti, min. 90; Spiritûs Ætheris Nitrosi, fl. drs. 2; Succi Taraxaci, fl. drs. 12; Tincturæ Sennæ, fl. oz. 4; Infusi Gentianæ Compositi, ad fl. oz. 8. Mix. One-sixth part twice or thrice daily.

In dyspepsia with debility and constipation. Also in passive hepatic congestion, in amenorrhœa with a loaded liver, &c.

148. Alkaline Aperients.

℞. Decocti Aloes Compositi, Infusi Gentianæ Compositi, āā fl. oz. 4; Tincturæ Nucis Vomicæ, fl. drm. 1; Liquoris Potassæ, fl. drs. 2. Mix. One-sixth part, with two or three tablespoonfuls of water, early every morning.

Useful in bilious headache.

℞. Sodæ Sulphatis, oz 1½; Sodæ Phosphatis, oz. 1; Syrupi Zingiberis, fl. drs. 6; Aquæ ad fl. oz. 8. Mix. Three large tablespoonfuls immediately; the dose to be repeated after two hours, unless the bowels should be freely acted on.

℞. Sodæ Sulphatis, Sulphuris Præcipitati, āā oz. 1½. Mix. Label,—"One teaspoonful in a tumblerful of milk and water early in the morning.

In rheumatoid arthritis, chronic rheumatism, sciatica, pruritus, &c.

149. Phosphate of Soda and Aloes.

℞. Extracti Rhei, gr. 10; Sodæ Phosphatis, gr. 60; Decocti Aloes Compositi, fl. drs. 6; Aquæ Menthæ Viridis, ad fl. oz. 2. Make a draught. To be taken occasionally at bedtime.

In some forms of chronic gout, jaundice from gallstones, &c.

150. Aloes, Senna, and Epsom Salts.

℞. Vini Aloes, fl. drs. 2; Infusi Sennæ, fl. drs. 14; Magnesia Sulphatis, gr. 240. Mix. Half of this mixture to be taken about 7 o'clock in the morning, and the remainder two hours after breakfast, if required.

151. Jalap and Senna.

℞. Tincturæ Sennæ, fl. oz. 1; Tincturæ Jalapæ, fl. drs. 2; Vini Colchici, fl. drm. 1; Aquæ Pimentæ, fl. oz. 2. Mix. Label,—"Half of this draught immediately, and the remainder in six hours, if necessary."

℞. Pulveris Jalapæ Compositi, gr. 30—60; Syrupi Sennæ, fl. drm. 1; Aquæ Camphoræ, fl. drs. 15. Make a draught. To be taken early every morning.

In dropsy.

℞. Jalapæ Resinæ, gr. 3; Extracti Hyoscyami, gr. 2. Mix into a pill, to be taken at bedtime. An ounce and a half of the COMPOUND MIXTURE OF SENNA should be administered on the following morning.

In dropsy and in hepatic disease where an active purgative is needed.

152. Saline Purgative.

℞. Vini Antimoniale, fl. drm. 1; Magnesiæ Sulphatis, gr. 160; Liquoris Ammoniæ Acetatis, fl. drs. 12; Syrupi Papaveris, fl drs. 6; Aquæ Camphoræ, ad fl. oz. 8. Mix. One-sixth part two or three times in the twenty-four hours.

Simple fever with constipation. In hepatic congestion, &c.

153. Sulphur and Magnesia.

℞. Magnesiæ Carbonatis, gr. 20; Sulphuris Præcipitati, gr. 25; Sodæ Bicarbonatis, gr. 10; Pulveris Zingiberis, gr. 3. Make a powder. To be taken early in the morning in a tumblerful of milk.

A valuable aperient for delicate females subject to rheumatism. Also in prurigo, and some other skin diseases.

154. Steel and Aloes.

℞. Ferri Sulphatis Granulatæ, gr. 2; Pilulæ Aloes et Myrrhæ, gr. 3. Make a pill, to be taken thrice daily after meals.

In amenorrhœa, chlorosis, hysteria with constipation and debility, &c. See F. 421.

155. Pepsin and Aloes.

℞. Pepsinæ Porci, gr. 32; Extracti Aloes Barbadensis, gr. 4—8; Glycerini, sufficient to make a mass. Divide into eight pills, and order one to be taken every day at dinner. To prevent them from adhering to each other, these pills should either be silvered or coated with lycopodium—the delicate and tasteless powder contained in the spore cases of Lycopodium selago and Lycopodium clavatum.

Valuable in gastric and duodenal dyspepsia, some diseases of the rectum, certain forms of suppressed menstruation, &c.

156. Aloes and Galbanum.

℞. Pilulæ Aloes et Myrrhæ, Pilulæ Assafœtidæ Compositæ, ää gr. 5. Make two pills. To be taken night and morning.

In hysteria with attacks of flatulent colic, and in some forms of amenorrhœa with constipation.

157. Elaterium or Wild Cucumber.

℞. Liquoris Ammoniæ Acetatis, fl. drs. 9; Spiritûs Ætheris Nitrosi, fl. drs. 4; Elaterii, gr. 1; Syrupi Zingiberis, fl. drs. 3. Mix. Direct,—"Two small teaspoonfuls in a wineglassful of water every two hours, until the bowels are freely acted on."

In the early stages of acute dropsy with albuminuria.

℞. Elaterii, gr. 1½; Pulveris Capsici, gr. 9; Hydrargyri Subchloridi, gr. 12; Extracti Hyoscyami, gr. 18. Make a mass, divide into twelve pills, and order two to be taken for a dose.

If a very active purgative is required, the quantity of elaterium may be doubled. The capsicum prevents the nausea which this drug often produces.

℞. Elaterii, gr. 1; Digitalis Foliæ, gr. 2—4; Extracti Gentianæ, gr. 12. Divide into four pills, and order one to be taken every night.

In dropsical effusions, and where it is desirable to produce copious watery stools.

158. Gamboge and Galbanum.

℞. Pilulæ Cambogiæ Compositæ, Pilulæ Assafœtidæ Compositæ, ää gr. 5. Make two pills. To be taken every night at bedtime.

A good drastic hydragogue cathartic, acting chiefly upon the small intestines.

159. Calomel and Jalap, &c.

℞. Hydrargyri Subchloridi, gr 2—3; Pulveris Scammonii Compositi, gr. 4; Pulveris Aromatici, gr. 5. Mix, for a powder to be taken at bedtime.

A valuable purgative in the cerebral affections of children; also in cases of threadworm.

℞. Hydrargyri Subchloridi, gr. 2; Extracti Jalapæ, gr. 8. Make into two pills, and order them to be taken at bedtime.

In cerebral affections, &c.

℞. Hydrargyri Subchloridi, gr. 5; Pulveris Jalapæ Compositi, gr. 20—40. Make a powder, to be taken every night at bedtime.

A good hydragogue cathartic. The calomel increases the effect of the jalap and acid tartrate of potash (cream of tartar).

℞. Hydrargyri Subchloridi, gr. 2; Pulveris Rhei, gr. 20; Jalapæ Resinæ, gr. 2; Pulveris Zingiberis, gr. 4. Mix. To be taken as a bolus, in a little wafer-paper, at bedtime.

160. Podophyllum Peltatum, or May-apple.

℞. Podophylli Resinæ, gr. ½; Pulveris Rhei, gr. 5; Extracti Hyoscyami, gr. 3. Make two pills. To be taken every night at bedtime.

As a purgative in jaundice from suppression, in torpid liver, and in dropsy from cardiac or renal or hepatic disease. Podophyllin produces copious bilious stools: but it is rather uncertain, and is apt to gripe unless combined with henbane.

℞. Podophylli Resinæ, gr. 6; Pulveris Zingiberis, gr. 20; Jalapæ Resinæ, gr. 10; Digitalis Foliæ, gr. 3; Extracti Hyoscyami, gr. 14. Make a mass, divide into twelve pills, and order two to be taken every other night at bedtime.

As a drastic purgative in dropsy. See F. 30.

161. Ammonia and Rhubarb.

℞. Spiritûs Ammoniæ Aromatici, fl. drs. 4; Tincturæ Rhei, fl. oz. 2; Infusi Rhei, ad fl. oz. 8. Mix. One-sixth part to be taken night and morning.

162. Gentian, Ether, and Rhubarb.

℞. Tincturæ Rhei, fl. oz. 1; Tincturæ Gentianæ Compositæ, fl. oz. 2; Spiritûs Ammoniæ Aromatici, Spiritûs Ætheris, āā fl. drs. 4; Aquæ Pimentæ, fl. oz. 4. Mix. Two tablespoonfuls to be taken occasionally.

In cases of colic, flatulence, nausea, or languor, where a warm stomachic aperient is needed.

163. Hellebore and Colchicum.

℞. Tincturæ Hellebori (Phar. Lond. 1851), min. 30; Vini Colchici, min. 25; Tincturæ Rhei, fl. drs. 2; Aquæ Camphoræ, ad fl. oz. 2. Make a draught. To be taken occasionally early in the morning.

Useful in gout, chronic rheumatism, &c.

164. Castor Oil.

℞. Olei Ricini, fl. drs. 2—4. To be taken occasionally about 11 A.M. The taste of castor oil is entirely destroyed by mixing it with a teacupful of well salted and peppered beef tea.

℞. Mucilaginis Tragacanthæ, fl. oz. 2; Aquæ Cinnamomi, fl. oz. 3; Olei Ricini, fl. drs. 12; Tincturæ Rhei, Syrupi Aurantii, āā fl. drs. 6; Tincturæ Opii, min. 30. Mix. One-eighth part every three hours.

In dysentery, when there are scybala in the rectum. Also where an aperient with a sedative is indicated.

165. Rhubarb and Magnesia, or Soda.

℞. Magnesiæ Carbonatis, gr. 120; Pulveris Rhei, gr. 60; Vini Ipecacuanhæ, fl. drs. 2; Pulveris Aromatici, gr. 40; Aquæ Menthæ Piperitæ, fl. oz. 8. Mix. Three tablespoonfuls to be taken every morning.

℞. Pulveris Rhei, Sodæ Bicarbonatis, āā gr. 20; Infusi Rhei, fl. oz. 1. Make a draught. To be taken early in the morning, with two or three tablespoonfuls of water, twice or thrice a week.

For gouty and rheumatic subjects.

The officinal PULVIS RHEI COMPOSITUS, in doses of 20 to 120 grains, is a valuable mild aperient where the intestinal secretions are deranged or diminished in quantity.

It is commonly known as Gregory's powder.

166. Epsom Salts and Sulphate of Iron.

℞. Magnesiæ Sulphatis, gr. 120; Ferri Sulphatis, gr. 4; Acidi Sulphurici Diluti, min. 15; Extracti Quassiæ, gr. 20; Aquæ Pimentæ, fl. oz. 2. Make a draught. To be taken early in the morning.

In constipation with general debility.

167. Colocynth and Tartarated Antimony.

℞. Pilulæ Colocynthidis et Hyoscyami, gr. 56; Antimonii Tartarati, gr. 4. Divide into twelve pills, and order one to be taken every night at bedtime.

A valuable purgative in the cerebral congestions of strong subjects.

168. Croton Oil.

℞. Olei Crotonis, min. 1—2; Olei Caryophylli, min. 2; Micæ Panis, sufficient to make a pill. To be taken immediately, and repeated in two hours if necessary.

℞. Olei Crotonis, min. 2; Olei Theobromæ, gr. 30. Make a suppository. To be introduced into the rectum early in the morning—about 5 A.M.

℞. Olei Crotonis, min. 1—2; Pilulæ Colocynthidis Compositæ, gr. 30; Pilulæ Assafœtidæ Compositæ, gr. 60. Make a mass, divide into eighteen pills, and order three to be taken every night at bedtime.

In cases of sciatica, obstinate neuralgia, &c., with constipation.

169. Seidlitz Powder.

℞. Sodæ Bicarbonatis, gr. 40; Sodæ Tartaratæ, gr. 120. Mix, and make an effervescing draught with thirty-seven grains of Tartaric or Citric Acid dissolved in a tumblerful of water.

The officinal EFFERVESCENT CITRO-TARTRATE OF SODA, in doses of a couple of teaspoonfuls, in a small tumblerful of cold or tepid water, is a very agreeable and mild aperient.

170. Purified Ox Bile.

℞. Ammoniæ Carbonatis, gr. 34; Fellis Bovini Purificati, gr. 36. Make a mass, divide into twelve pills, silver them, and order one to be taken three hours after each of the principal meals.

In dyspepsia with nausea, constipation, and a deposit of urates in the urine.

℞. Jalapæ Resinæ, gr. 6—18; Fellis Bovini Purificati, gr. 24; Olei Carui, min. 10; Pilulæ Assafœtidæ Compositæ, gr. 18. Make a mass, divide into twelve pills, and order two to be taken every night two hours after supper.

To prevent an accumulation of fæces, when the large intestines are torpid. Also where there is a deficiency of bile.

℞. Pilulæ Colocynthidis et Hyoscyami, Fellis Bovini Purificati, Extracti Lupuli, ää gr. 20. Make a mass, divide into twelve pills, silver them, and order one to be taken every day three hours after dinner.

In constipation with flatulence and imperfect digestion of the food.

℞. Magnesiæ Carbonatis, gr. 30; Tincturæ Jalapæ, fl. drs. 2; Tincturæ Sennæ, fl. oz. 1; Fellis Bovini Purificati, gr. 30; Aquæ Camphoræ, ad fl. oz. 4. Mix, and label,—"Half of this mixture immediately, and the remainder in three hours if necessary."

A valuable purgative when the rectum is blocked up by hardened fæces.

CAPSULES containing pig's bile, evaporated to dryness, have been prepared according to the directions of Dr. Harley. Each capsule contains five grains of prepared bile,—equal to one hundred grains of liquid bile fresh from the gall-bladder. Two or three are to be taken for a dose, about two hours after a meal; when stomachal digestion being nearly completed, the chyme is ready to pass into the duodenum. The capsules imbibe moisture in the stomach; and then, in their soft swollen condition, generally get ruptured as they pass through the pylorus. In this way the

bile is mingled with the chyme at the same time that the intermixture happens in the healthy organism.

In jaundice from long-continued obstruction. Also in some forms of duodenal dyspepsia arising from sedentary habits.

171. Rhubarb, Mercury, and Henbane.

℞. Pilulæ Hydrargyri (*vel* Hydrargyri cum Cretâ), Pilulæ Rhei Compositæ, Extracti Hyoscyami, ää gr. 20. Mix, divide into twelve pills, and order two to be taken occasionally at bedtime.

Where a stronger purgative is required the compound colocynth may be substituted for the compound rhubarb pill.

172. Sulphate of Manganese.

℞. Manganesii Sulphatis, gr. 180; Vini Colchici, min. 15; Infusi Sennæ, Infusi Gentianæ Compositi, ää fl. oz. 1. Make a draught, to be taken early in the morning.

In gouty or rheumatic habits, with a deficient secretion of bile.

173. Colocynth and Assafœtida.

℞. Pilulæ Colocynthidis et Hyoscyami, Pilulæ Assafœtidæ Compositæ, ää gr. 5. Mix into two pills. To be taken occasionally at bedtime.

In constipation with flatulence. A valuable purgative for hypochondriasis.

174. Gamboge, Aloes, and Blue Pill.

℞. Pilulæ Cambogiæ Compositæ, gr. 5; Pilulæ Hydrargyri, gr. 3. Make two pills. To be taken night and morning.

In dropsy from cardiac or hepatic disease where a drastic purgative is required.

175. Extract of Nux Vomica.

℞. Extracti Nucis Vomicæ, gr. 3; Pulveris Ipecacuanhæ, gr. 6; Pilulæ Rhei Compositæ, *vel* Pilulæ Aloes et Assafœtidæ, gr. 40. Make a mass, divide into twelve pills, and order two to be taken every alternate night at bedtime.

In habitual constipation from atony of the coats of the bowel, with deficient secretion of intestinal mucus.

℞. Extracti Nucis Vomicæ, gr. 2: Extracti Aloes Barbadensis, gr. 6; Extracti Rhei, gr. 20. Mix and divide into six pills. One to be taken every day at dinner.

In torpor of the colon, some diseases of the rectum, &c.

℞. Extracti Hyoscyami, gr. 40; Pilulæ Colocynthidis Compositæ, *vel* Jalapæ Resinæ, gr. 20; Extracti Nucis Vomicæ, gr. 3. Mix, and divide into twelve pills. One pill to be taken every night.

In habitual constipation. They may be continued for about ten days. See F. 378, 387, and 409.

176. Rhubarb and Magnesia for Infants.

℞. Pulveris Rhei, gr. 15; Magnesiæ Carbonatis, gr. 60; Aquæ Anethi, fl. drs. 12 Mix, and order one teaspoonful to be taken every two hours until the bowels are freely acted on.

177. Sulphate of Zinc and Nux Vomica.

℞ Zinci Sulphatis, gr. 24; Extracti Nucis Vomicæ, gr. 2; Extracti Anthemidis, gr. 30. Mix, divide into twelve pills, and order one to be taken three times a day.

For habitual constipation, after the bowels have been cleared out with a purgative of calomel and colocynth. The pills should be taken immediately after meals, for two or three weeks. They ought to be discontinued gradually.

178. Quinine and Rhubarb.

℞. Quiniæ Sulphatis, gr. 2; Extracti Lupuli, gr. 5; Pilulæ Rhei Compositæ, gr. 3. Mix into two pills, and order them to be taken every day, at dinner.

Useful in some forms of dyspepsia, with want of tone.

179. Ipecacuanha, Rhubarb, and Oxide of Silver.

℞. Pulveris Ipecacuanhæ, gr. 1; Pulveris Rhei, gr. 8; Argentii Oxidi, gr. 1; Confectionis Rosæ Caninæ, sufficient to form a pill.

A good dinner-pill, where there is uneasiness and oppression after meals, the result of slow digestion.

180. Steel, Glauber's Salts, &c.

℞. Ferri Sulphatis Granulatæ, gr. 10; Sodæ Sulphatis, Magnesiæ Sulphatis, āā oz. 1; Sodii Chloridi, gr. 120; Aquæ O. 1. Mix. Four tablespoonfuls in a tumblerful of warm water, early in the morning.

A rough imitation of the Cheltenham Waters. Useful in debility, with constipation.

181. Steel, Glauber's Salts, and Soda.

℞. Sodæ Bicarbonatis, gr. 60; Sodii Chloridi, gr. 4; Sodæ Sulphatis, gr. 10; Magnesiæ Sulphatis, gr. 3; Ferri Sulphatis, gr. ½—1; Aquæ O. 1. Mix. By adding forty grains of Citric Acid, an effervescing water is produced.

A rough imitation of the Vichy Waters. In some forms of chronic gout, &c.

℞. Sodæ Sulphatis, gr. 120—240; Sodæ Carbonatis, gr. 20; Sodii Chloridi, gr. 15; Cretæ Preparatæ, gr. 10; Ferri Carbonatis Saccharatæ, gr. 15. Make a powder, and direct it to be taken early in the morning, in half a pint of water.

An imitation of the Carlsbad Waters.

182. Kamela, as an Anthelmintic.

℞. Pulveris Kamelæ, gr. 60—180, *vel* Tincturæ Kamelæ, fl. drs. 2; Syrupi Aurantii, fl. drs. 2; Mucilaginis Tragacanthæ, fl. drs. 12; Aquæ, ad fl. oz. 3. Make a draught. To be taken early in the morning. A purgative should be administered six hours afterwards. Kamela is an orange-red resinous substance found adhering to the capsules of the Rottlera tinctoria, and is imported from India.

Strongly recommended in tapeworm.

183. Turpentine, as an Anthelmintic.

℞. Olei Ricini, fl. drs. 4; Olei Terebinthinæ, fl. drs. 3; Mucilaginis Tragacanthæ, fl. drs. 4; Syrupi Zingiberis, fl. drm. 1; Aquæ, fl. drs. 4. Make a draught, to be taken early in the morning.

In tapeworm, &c.

184. Kousso, as an Anthelmintic.

℞. Cusso, in pulvere, gr. 240; Mellis Depurati, sufficient to make an electuary. Label,—"Half of this electuary to be taken early in the morning, and the remainder six hours afterwards."

In tapeworm.

The officinal INFUSUM CUSSO may also be taken in the same way, in doses of fl. oz. 4—8.

185. Santonin, as an Anthelmintic.

℞. Santonini, gr. 2—6; Sacchari Lactis, gr. 15. Make a powder. To be taken early in the morning, suspended in a tablespoonful of cream. The patient ought to have fasted for twelve hours previously. The dose may be repeated daily for eight or ten days, if necessary; and its exhibition should be followed at the end of six hours by the administration of an ounce of the Compound Decoction of Aloes.

A specific for the ascaris lumbricoides. Less useful for the tænia solium and oxyuris vermicularis. The patient should be warned that after a few doses the sight sometimes becomes perverted, so that objects seem to acquire a blue or yellow or some other color. One-third of a grain of the resin of podophyllum, added occasionally to the dose of santonin, appears to increase its efficacy.

186. Pomegranate, as an Anthelmintic.

℞. Spiritûs Ætheris, min. 30—60; Decocti Granati Radicis, fl. oz. 1—2. Make a draught. To be taken every three hours until four doses have been used.

℞. Granati Radicis Corticis, gr. 180; Pulveris Sabadillæ, gr. 6; Pulveris Aromatici, gr. 60. Mix, and divide into six powders. One to be taken every two hours until the whole is consumed.

More active than the preceding. A saline purge should be given after the last dose.

187. Male Fern, as an Anthelmintic.

℞. Extracti Filicis Liquidi, min. 20—40; Syrupi Zingiberis, fl. drs. 2; Mucilaginis Tragacanthæ, fl. oz. 2; Aquæ, ad fl. oz. 4. Make a draught. To be taken early in the morning; only liquid nourishment having been allowed the previous day. Four hours afterwards a purgative dose of castor oil or compound decoction of aloes should be administered.

Especially useful for destroying tapeworms.

188. Simple Enemata.

℞. Sodii Chloridi, oz. 1; Decocti Hordei, fl. oz. 12. Mix, to form an enema.

In simple constipation, to destroy oxyurides, &c.

℞. Olei Olivæ, fl. oz. 6—8. To be warmed and then injected into the rectum. It should be retained for twelve or eighteen hours.

Very useful in structural disease of the large bowel, impaction of hardened fæces, &c.

℞. Olei Olivæ, fl. drs. 12; Magnesiæ Sulphatis, gr. 220; Decocti Hordei, ad fl. oz. 12. Mix, for an enema. The officinal ENEMA MAGNESIÆ SULPHATIS contains one ounce of Epsom salts, and one ounce of olive oil, to fifteen ounces of fluid starch.

℞. Saponis Mollis, oz. 1; Aquæ Calidæ, fl. oz. 12. Mix for an enema.

189. Castor Oil and Rue Enema.

℞. Olei Rutæ, min. 6; Olei Ricini, fl. oz. 1; Tincturæ Assafœtidæ, fl. drs. 2; Decocti Avenæ, fl. oz. 7. Mix.

Exceedingly useful in flatulent colic.

190. Castor Oil and Turpentine Enema.

℞. Olei Ricini, fl. drs 12; Olei Terebinthinæ, fl. drs. 4; Tincturæ Assafœtidæ, fl. drs. 2; Decocti Avenæ, ad fl. oz. 12. Mix.

In obstinate constipation. It should be thrown up into the bowel by means of a long tube like that of a stomach-pump.

191. Croton Oil Enema.

℞. Olei Crotonis, min. 6; Olei Ricini, fl. oz. 1; Olei Terebinthinæ, fl. drs. 2; Decocti Hordei, ad fl. oz. 6. Mix.

In obstinate constipation. It should be retained for three or four hours, if possible.

192. Steel and Aloes Enema.

℞. Tincturæ Ferri Perchloridi, fl. drs. 1—3; Extracti Quassiæ, gr. 5; Extracti Aloes Barbadensis, gr. 2; Infusi Quassiæ, fl. oz. 8. Mix.

To destroy oxyurides. It has often seemed advantageous to the author to administer a dose of calomel and scammony at the same time.

193. Tobacco Enema.

℞. Tabaci Communis, gr. 15; Aquæ Bullientis, fl. oz. 8. Mix.

To be employed cautiously in some exceptional cases of strangulated hernia, obstinate constipation, &c.

194. Purgative Electuaries.

℞. Confectionis Sennæ, Potassæ Tartratis Acidæ, Extracti Taraxaci, ää oz. 1. Mix. One teaspoonful to be taken occasionally, an hour before breakfast.

In constipation with inactive liver, or hæmorrhoids.

℞. Confectionis Piperis, Syrupi Sennæ, Confectionis Sulphuris, āā oz. 1; Pulveris Jalapæ, gr. 30. Mix. One teaspoonful every morning.
In constipation with chronic rheumatism.

℞. Confectionis Sulphuris, oz. 2; Extracti Taraxaci, oz. 1. Mix and label,—"One teaspoonful daily before breakfast."
In many diseases of the rectum.

℞. Confectionis Sennæ, oz. 2; Confectionis Scammonii, Syrupi Zingiberis, āā oz. 1; Ferri Carbonatis Saccharatæ, gr. 220. Mix. One teaspoonful early every morning.
In some forms of constipation and want of tone.

IX. CAUSTICS AND COUNTER-IRRITANTS.

195. Acid Solution of Nitrate of Mercury.

℞. Liquoris Hydrargyri Nitratis Acidi, fl. drs. 2; Pulveris Tragacanthæ Compositi, sufficient to make a mass.
To be applied as a paste over the surface to be destroyed. Instead, it is sometimes better to apply the caustic fluid itself for certain cases of cancer or lupus. The solution may also be carefully used to sloughing ulcers, boils, small nævi, &c. It is to be very lightly painted on by means of a glass brush, or a glass rod.

196. Chromic Acid.

℞. Acidi Chromici, gr. 60; Aquæ, fl. drs. 4. Mix.
To destroy warts, small growths of epithelial cancer, &c.

197. Chloride of Zinc, &c.

℞. Bromii Chloridi, Zinci Chloridi, Auri Chloridi, Antimonii Chloridi, of each equal parts. Mix into a paste of sufficient thickness with flour or powdered liquorice.
To destroy cancerous growths. Commonly known as Landolfi's paste.

℞. Sanguinariæ Canadensis, oz. ½—1; Zinci Chloridi, oz. ½—2; Aquæ, fl. oz. 2; Farinæ, sufficient to make a paste. Mix.
The paste thus formed should have the consistence of treacle. This is the caustic which was employed by Dr. Fell.

℞. Zinci Chloridi, gr. 30—60; Farinæ, gr. 120; Aquæ Destillatæ, sufficient to form a mass. To be applied over the diseased surface.

198. Supersulphate of Zinc.

Take half a fluid ounce of sulphuric acid, and saturate it with sulphate of zinc, previously dried and powdered. Sir J. Y. Simpson recommends that this caustic should be used by dipping a pen in it, and then drawing lines across the tumor, so as to eat through the skin in a few minutes. The fissures thus made are to be filled with the paste; renewing the scratching and caustic every day or two. In this way, five or eight days may suffice for the removal of a good sized tumor. By this combination also we can penetrate deeply without hardening the parts and without fear of producing hemorrhage.
This is a very valuable caustic, and has been found particularly useful by the author for the removal of cancerous tumors of the breast, &c. The pain which it produces will be best mitigated by employing the subcutaneous injection of morphia (F. 314) at each application.

199. Arsenical Mucilage.

℞. Acidi Arseniosi, Pulveris Acaciæ, āā oz. 1; Aquæ, fl. drs. 5. Mix.
The late Dr. W. Marsden spoke highly of this caustic in epithelioma; but the author has had no experience with it, inasmuch as he prefers less dangerous appli-



from danger.

201. Red Oxide of Mercury Powder.

℞. Hydrargyri Oxidi Rubri, Aluminis, āā, gr. 60. Make a powde
To be sprinkled over exuberant and spongy granulations.

202. Carbonate of Copper Ointment.

℞. Cupri Carbonatis, gr. 60; Adipis Preparati, oz. ½. Mix, to f
ment.—DEVERGIE.
In chronic eczema and impetigo of the scalp where stimulating ap
required.

203. Dupuytren's Arsenic and Calomel Powder.

℞. Acidi Arseniosi, gr. 12; Hydrargyri Subchloridi, oz. 1. Mix.
In ulcerated lupus. Must be very cautiously used.

204. Vienna Caustic.

℞. Potassæ Causticæ, Calcis, āā oz. 1. Mix thoroughly.
This paste is diluted with alcohol, and applied with a spatula over a s
It is identical with the Potassa cum calce of the London Pharmacopœi

205. Iodine Paint.

℞. Iodinii, gr. 40; Potassii Iodidi, gr. 80; Spiritûs Vini Rectifi
Mix.
To be applied with a camel's-hair pencil. Very useful in many cl
&c.

℞. Iodinii, Potassii Iodidi, āā grs. 20; Collodii, fl. oz. 1. Mix.

℞. Iodinii, gr. 120; Olei Petrolei Albi, fl. oz. 1. Mix.
To be applied with a firm brush. Very useful in ringworm: two o
cations, at intervals of eight or ten days, will frequently effect a cure.

The officinal LINIMENTUM IODI may also be used, but it must be
from one to three parts of spirit or glycerin or tincture of aconite.

206. Tartar Emetic Embrocation.

208. Blistering and Epispastic Papers.

These papers of M. Albespeyre have long been used in this country with great advantage, though they are less appreciated than in France.

They consist of—an epispastic paper for dressing blisters; a dulcifying paper for issues, causing neither smell nor pain; and blisters formed of an adhesive cloth without a plaster.

The Epispastic Paper, for dressing blisters, is prepared of four degrees of strength, under the designation No. 1 feeble, No. 1, No. 2, and No. 3. No. 1 feeble possesses the least strength, and is suitable as a dressing for persons of irritable temperament, and for children. No. 1 has rather more salve spread upon it, and is adapted for patients whose blisters have risen well. No. 2 is employed for those whose blisters do not draw sufficiently, and require stimulating. Whilst No. 3 possesses a still stronger power, and is used only in cases where the blister has a tendency to dry up. They all maintain an abundant discharge, without pain or heat; prevent the formation of false membranes; produce no irritation of the urinary passages; and cause no disagreeable smell.

The blisters—applied by the adhesive black side—readily adhere to the skin, producing vesication in a few hours (twelve at the furthest); and, if necessary, the same piece put on four or five times always gives rise to the blistering effect. They are, however, less required by British practitioners than they were prior to 1867, because there is now an excellent officinal CHARTA EPISPASTICA.

X. DIAPHORETICS AND DIURETICS.

209. Nitre and Ipecacuanha.

℞. Potassæ Nitratis, gr. 60, *vel* Potassæ Citratis, gr. 120; Vini Ipecacuanhæ, fl. drs. 2; Syrupi Hemidesmi, fl. oz. 1; Decocti Hordei, ad O. 1. Mix. One small teacupful to be taken every two or three hours.

In severe catarrh with sore throat.

210. Antimony and Opium.

℞. Vini Antimoniale, fl. drs. 1—2; Liquoris Ammoniæ Acetatis, fl. drs. 12; Extracti Opii Liquidi, min. 30; Aquæ Camphoræ, ad fl. oz. 8. Mix. One-sixth part three times a day.

Each fluid drachm of the wine contains one-quarter of a grain of antimony.

211. Citrate of Potash and Ammonia.

℞. Potassæ Citratis, gr. 120; Liquoris Ammoniæ Acetatis, fl. drs. 18; Spiritûs Ammoniæ Aromatici, fl. drs. 3; Tincturæ Aconiti, min. 20; Aquæ, ad fl. oz. 8. Mix. One-sixth part every four or six hours.

In pneumonia, and many other acute inflammations. Sometimes it is preferable to give only the Solution of Acetate of Ammonia diluted with water (two or three fluid drachms to two ounces).

212. Ether and Ammonia.

℞. Potassæ Nitratis, gr. 30—60; Spiritûs Ætheris Nitrosi, fl. drs. 3; Liquoris Ammoniæ Acetatis, fl. drs. 12; Aquæ Camphoræ, ad fl. oz. 8. Mix. One-sixth part three or four times a day.

In the early stages of many febrile and inflammatory disorders.

℞. Ammoniæ Carbonatis, gr. 18—30; Spiritûs Chloroformi, fl. drs. 3; Vini Colchici, min. 30; Liquoris Ammoniæ Acetatis, fl. drs. 20; Mucilaginis Tragacanthæ, fl. oz. 4; Aquæ, ad fl. oz. 8. Mix. One-sixth part every four hours.

Valuable in some forms of pneumonia, gouty inflammation, &c.

213. Dover's Powder and Antimony, &c.

℞. Pulveris Ipecacuanhæ Compositi, gr. 5; Antimonii Tartarati, gr. ½. Mix, and make a powder, to be taken every six hours.

℞. Pulveris Opii, Pulveris Ipecacuanhæ, āā gr. 1; Potassæ Nitratis, gr. 8. Make a powder, to be taken every night at bedtime.
An improvement on the ordinary Dover's powder.

214. Senega and Guaiac.

℞. Tincturæ Guaiaci Ammoniatæ, fl. drs. 3—6; Mucilaginis Tragacanthæ, fl. oz. 3. Mix thoroughly together, and then add—Infusi Senegæ, ad fl. oz. 8. Three tablespoonfuls to be taken thrice daily.
Useful in the latter stages of bronchitis, tonsillitis, &c. The action is diaphoretic, diuretic, stimulant, and expectorant.

℞. Tincturæ Guaiaci Ammoniatæ, fl. drs. 2; Vitelli Ovi, 1. Beat thoroughly together, and then add—Misturæ Amygdalæ, fl. oz. 4. Direct—"One-half to be taken twice a day."
In chronic rheumatism.

215. Benzoate of Ammonia and Juniper.

℞. Ammoniæ Benzoatis, gr. 60—120; Syrupi Hemidesmi, fl. oz. 1; Spiritûs Juniperi, fl. drs. 6; Aquæ, ad fl. oz. 8. Mix. One-sixth part three times a day.
As a diuretic in dropsy and gout. In cases where the urine is loaded with phosphates. Also in catarrhal inflammation of the bladder with alkaline urine.

216. Ipecacuanha and Syrup of Poppies.

℞. Vini Ipecacuanhæ, fl. drs. 2; Syrupi Papaveris, fl. drs. 3; Mucilaginis Tragacanthæ, fl. oz. 1; Aquæ, ad fl. oz. 3. Mix. One teaspoonful every two or three hours.
An infantile cough mixture.

217. Antimony and Ipecacuanha.

℞. Vini Antimoniale, min. 75; Vini Ipecacuanhæ, fl. drs. 2; Syrupi Rhœados, fl. drs. 3; Liquoris Ammoniæ Acetatis, fl. drs. 2; Aquæ, ad fl. oz. 6. Mix. A small tablespoonful every two hours.
A depressing mixture for children two or three years of age.

218. Ipecacuanha and Syrup of Poppies.

℞. Vini Ipecacuanhæ, fl. drs. 2; Syrupi Papaveris, fl. drs. 3; Liquoris Ammoniæ Acetatis, fl. drs. 4; Spiritûs Ætheris Nitrosi, fl. drm. 1; Aquæ, ad fl. oz. 2. Mix. One teaspoonful every two or three hours.
In the early stage of infantile fever, severe catarrh, bronchitis, and pneumonia.

219. Squills, Digitalis, Broom, &c.

℞. Potassæ Acetatis, gr. 120; Syrupi Scillæ, fl. drs. 6; Spiritûs Ætheris Nitrosi, fl. drs. 3; Tincturæ Digitalis, min. 30—fl. drm. 1; Succi Scoparii, fl. drs. 6; Aquæ, ad fl. oz. 8. Mix. One-sixth part every six or eight hours.
As a diuretic in dropsy dependent upon disease of the heart, liver, or peritoneum.

℞. Tincturæ Scillæ, fl. drs. 2; Tincturæ Camphoræ Compositæ, fl. drs. 4; Liquoris Ammoniæ Acetatis, fl. drs. 12; Decocti Scoparii, ad fl. oz. 8. Mix. One-sixth part three times a day.
Diuretic and diaphoretic. In dropsies unaccompanied by inflammation, and not due to renal disease.

℞. Spiritûs Juniperi, fl. drs. 4; Potassæ Tartratis Acidæ, oz. 1; Decocti Scoparii, ad fl. oz. 12. Mix. One-sixth part three times a day.
Diuretic and laxative.

℞. Pulveris Scillæ, gr. 6; Digitalis Foliæ, gr. 8—12; Pilulæ Hydrargyri, gr. 30. Make a mass, divide into twelve pills, and order one to be taken night and morning with a wineglassful of the DECOCTUM SCOPARII. See F. 224.

220. Solution of Potash and Digitalis.

℞. Liquoris Potassæ, fl. drs. 1—2; Spiritûs Ætheris Nitrosi, fl. drs. 6; Tincturæ Croci, fl. drs. 3; Infusi Digitalis, fl. drs. 12; Syrupi, fl. drs. 6; Aquæ, ad fl. oz. 8. Mix. One-sixth part three times a day.

A valuable diuretic in some forms of cardiac and hepatic dropsy.

221. Nitre, Juniper, and Ether.

℞. Potassæ Nitratis, gr. 60; Spiritûs Juniperi, fl. drs. 1—2; Spiritûs Ætheris Nitrosi, fl. drs. 3; Decocti Chimaphilæ (Phar. Lond. 1851), ad fl. oz. 8. Mix. One-sixth part every six hours.

A tonic and stimulating diuretic. In scrofula, atonic dropsies, catarrhal inflammation of the bladder, and some skin diseases.

222. Buchu and Cream of Tartar.

℞. Potassæ Tartratis Acidæ, gr. 180; Infusi Buchu, fl. oz. 8. Mix. One-sixth part three times a day.

Diuretic and laxative. In irritable conditions of the bladder owing to excess of uric acid in the urine. Also in chronic rheumatism, dropsy, and some cutaneous diseases.

223. Buchu, Borax, and Pareira.

℞. Boracis, gr. 40; Tincturæ Buchu, fl. drs. 6; Extracti Pareiræ Liquidi, fl. drs. 6; Decocti Pareiræ, ad fl. oz. 8. Mix. One-sixth part every six or eight hours.

In chronic catarrh of the bladder, calculous affections, &c.

224. Digitalis, Squills, &c.

℞. Potassæ Citratis, gr. 200; Tincturæ Scillæ, fl. drs. 2; Vini Colchici, fl. drs. 1½; Liquoris Ammoniæ Acetatis, fl. drs. 12; Infusi Digitalis, fl. oz. 3; Aquæ Menthæ Piperitæ, ad fl. oz. 8. Mix. One-sixth part three times a day.

Diuretic and sedative. In some forms of dropsy with disease of the mitral valve.

℞. Digitalis Foliæ, Pulveris Scillæ, āā gr. 12; Extracti Taraxaci, gr. 36. Make a mass, divide into twelve pills, and order one to be taken twice a day.

Valuable as a diuretic in mitral, but injurious in aortic, disease. See F. 219.

225. Urea.

℞. Ureæ, gr. 5—15; Syrupi Aurantii, fl. drm. 1; Aquæ, fl. oz. 2. Make a draught, to be taken every six hours.

Recommended by the author as a diuretic in dropsy due to cardiac disease. See Medical Times and Gazette, May 8th, 1852.

226. Cantharides and Nitrous Ether.

℞. Tincturæ Cantharidis, fl. drs. 1—2; Spiritûs Ætheris Nitrosi, fl. drs. 3; Spiritûs Juniperi, fl. drs. 4; Syrupi Zingiberis, fl. drs. 6; Aquæ, ad fl. oz. 8. Mix. One-sixth part three times a day.

May be cautiously tried in some cases of suppression of urine. Also in some skin diseases.

227. Taraxacum and Nitric Acid.

℞. Acidi Nitrici Diluti, fl. drm. 1; Succi Taraxaci, fl. drs. 6; Decocti Taraxaci, ad fl. oz. 8. Mix. One-sixth part three times a day.

Laxative, alterative, and diuretic. Especially useful in a disease of the liver unaccompanied by inflammation.

228. Cream of Tartar and Taraxacum.

℞. Potassæ Tartratis Acidæ, oz. 1; Extracti Taraxaci, gr. 30; Decocti Taraxaci, fl. oz. 8. Mix. One-sixth part three times a day.

In jaundice independent of hepatitis or obstruction of the duct of the gall-bladder.

229. Oil of Juniper.

℞. Olei Juniperi, min. 20; Syrupi Limonis, fl. drs. 6; Muciliaginis Acaciæ, fl. oz. 4; Aquæ, ad fl. oz. 12. Mix. One-sixth part every six or eight hours.

The oil of juniper has not only a diuretic action, but it is also a diaphoretic and an emmenagogue and a cathartic. In too large doses it may cause inflammation of the bladder.

230. Conium, Digitalis, and Calomel.

℞. Digitalis Foliæ, Hydrargyri Subchloridi, āā gr. 5; Extracti Conii, gr. 60. Make a mass, divide into fifteen pills, and order one to be taken three times a day.

As a sedative and diuretic in dropsy from cardiac disease.

XI. EMETICS AND EXPECTORANTS.

231. Depressing Emetics.

℞. Antimonii Tartarati, gr. 1—2; Vini Ipecacuanha, fl. drs. 2; Aquæ, ad fl. oz. 2. Make a draught, to be taken immediately.

Its action should be aided by the free administration of warm water.

℞. Antimonii Tartarati, gr. 1; Pulveris Ipecacuanhæ, gr. 20. Make a powder. To be taken in honey or cream, or as a bolus in wafer-paper.

℞. Vini Ipecacuanhæ, fl. oz. 1. To be taken when it is desired to induce vomiting.

For children one fluid drachm, in tea or sweetened water, will generally suffice.

232. Stimulant Emetics.

℞. Pulveris Sinapis, oz. ½; Aquæ, fl. oz. 3. Make a draught. To be taken immediately.

℞. Cupri Sulphatis, gr. 10; Aquæ, fl. oz. 3. Make an emetic draught.

℞. Zinci Sulphatis, gr. 20—40; Aquæ, fl. oz. 3. Mix.

233. A Warm Emetic.

℞. Pulveris Ipecacuanhæ, Ammoniæ Carbonatis, āā gr. 20; Tincturæ Lavandulæ Compositæ, fl. drm. 1; Aquæ, fl. oz. 2. Make a draught. After taking it a tumblerful of infusion of Chamomile Flowers (Infusum Anthemidis) should be drunk.

Suggested by a formula of Dr. Druitt's. In the incipient stages of fever, erysipelas, &c.

234. Tartar Emetic Mixture.

℞. Antimonii Tartarati, gr. 2; Syrupi Rhœados, Aquæ, āā fl. drs. 4. Mix and label,—"One teaspoonful every two hours, in a wineglassful of water, until there is nausea."

As a depressant to the circulating and nervous systems.

235. Ammonia and Senega.

℞. Ammoniæ Carbonatis, gr. 30; Spiritûs Ætheris, fl. drs. 8; Tincturæ Scillæ, fl. drs. 2; Tincturæ Camphoræ Compositæ, fl. drs. 2—4; Tincturæ Lavandulæ Compositæ, fl. drs. 6; Infusi Senegæ, ad fl. oz. 8. Mix. Two tablespoonfuls every four hours.

In the chronic bronchitis of old people.

℞. Spiritûs Ammoniæ Aromatici, fl. drs. 4; Spiritûs Armoraciæ Compositi, min. 60; Tincturæ Senegæ, fl. drs. 6; Aquæ Camphoræ, ad fl. oz. 8. Mix. One-sixth part every six hours.

A valuable stimulating expectorant in some cases of chronic bronchitis.

℞. Ammoniæ Carbonatis, gr. 12; Vini Ipecacuanhæ, min. 40; Tincturæ Senegæ, fl. drs. 2; Syrupi Rhœados, fl. drs. 3; Aquæ ad fl. oz. 3. Mix. One dessertspoonful every two or three hours.

An excellent stimulating expectorant for young children recovering from croup. In hooping-cough, where the bronchi are loaded with mucus.

236. Squills, Nitric Acid, and Bark.

℞. Syrupi Scillæ, fl. drs. 6; Acidi Nitrici Diluti, fl. drm. 1; Tincturæ Hyoscyami, fl. drs. 3—6; Spiritûs Chloroformi, fl. drs. 2; Infusi Cinchonæ Flavæ, ad fl. oz. 8. Mix. One-sixth part twice or thrice daily.

In chronic catarrh with debility and restlessness.

237. Ammoniacum and Opium.

℞. Tincturæ Scillæ, fl. drs. 2; Extracti Opii Liquidi, min. 20—30; Syrupi Tolutani, fl. drs. 6; Misturæ Ammoniaci, ad fl. oz. 6. Mix. One-sixth part three times a day.

A sedative and expectorant mixture in the chronic bronchitis of elderly people.

238. Sarsaparilla and Squills.

℞. Extracti Sarsæ Liquidi, Syrupi Scillæ, ää fl. drs. 12. Mix, and label,—"One teaspoonful in a teacupful of barley-water frequently during the day."

An agreeable demulcent and expectorant in inflammation of the mucous membranes about the throat and air-passages.

239. Squills, Ammonia, and Morphia.

℞. Syrupi Scillæ, fl. drs. 6; Spiritûs Ammoniæ Aromatici, fl. drs. 3; Liquoris Morphiæ Hydrochloratis, fl. drm. 1 (equivalent to half a grain of the salt); Infusi Serpentariæ, ad fl. oz. 8. Mix. One-sixth part twice or thrice a day.

In chronic catarrh.

240. Antimony and Ether.

℞. Vini Antimoniale, fl. drs. 1½; Spiritûs Ætheris. fl. drs. 3; Mucilaginis Tragacanthæ, fl. oz. 3; Aquæ, ad fl. oz. 6. Mix. One-sixth part every four hours.

The quantity of antimonial wine should be doubled when it is desirable to induce a feeling of nausea.

241. Ipecacuanha and Indian Sarsaparilla.

℞. Vini Ipecacuanha, fl. drs. 2; Syrupi Hemidesmi, fl. drs. 3; Mucilaginis Acaciæ, fl. oz. 1; Aquæ, ad fl. oz. 2. Mix. One teaspoonful every two hours.

For children threatened with an attack of croup or bronchitis.

℞. Vini Ipecacuanhæ, fl. drs. 2; Syrupi Hemidesmi, fl. oz. 1; Infusi Lini, ad fl. oz. 8. Mix. One-sixth part every four hours.

An emollient and expectorant in catarrh.

242. Indian Tobacco and Hemlock.

℞. Tincturæ Lobeliæ Æthereæ, fl. drs. 3; Syrupi Papaveris, fl. drs. 6; Tincturæ Conii Fructus, fl. drs. 2—4; Misturæ Amygdalæ, ad fl. oz. 6. Mix. One-sixth part every four hours.

In spasmodic cough, and some forms of asthma.

243. Squills and Hemlock.

℞. Pilulæ Scillæ Compositæ, Extracti Conii, ää gr. 30. Make a mass, divide into 12 pills, and order two to be taken every night at bedtime.

In chronic catarrh when opium is objectionable.

244. Nitrous Ether, Ipecacuanha, and Hemlock.

℞. Vini Ipecacuanhæ, fl. drs. 1½; Spiritûs Ætheris Nitrosi, fl. drs. 6; Succi Conii, fl. drs. 3; Infusi Senegæ, ad fl. oz. 8. Mix. One-sixth part every six hours.
In chronic bronchitis, when an expectorant and sedative is required.

245. Dulcamara and Stramonium.

℞. Tincturæ Scillæ, fl. drs. 2; Tincturæ Stramonii, fl. drs. 1½; Infusi Dulcamaræ, ad fl. oz. 8. Mix. One-sixth part three times a day.
In chronic catarrh and rheumatism, especially where the secretions of the skin and kidneys are deficient.

246. Benzoic Acid and Squills.

℞. Acidi Benzoici, gr. 40; Syrupi Scillæ, Syrupi Rhœados, āā fl. drs. 12. Make a linctus, of which one small teaspoonful is to be ordered to be taken every four hours.
In chronic bronchial affections, with suppressed action of the liver. See F. 49.

247. Opium and Squills.

℞. Syrupi Scillæ, Syrupi Papaveris, Syrupi Limonis, Mucilaginis Tragacanthæ, āā fl. dr. 4. Make a linctus, of which a teaspoonful is to be directed to be taken frequently.

℞. Syrupi Scillæ, fl. dr. 12; Tincturæ Camphoræ Compositæ, fl. drs. 4. Make a linctus, and order one teaspoonful to be taken when the cough is troublesome. See F. 346, 347.

XII. GARGLES AND INHALATIONS.

248. Hydrochloric Acid Gargle, &c.

℞. Acidi Hydrochlorici Diluti, fl. drs. 3; Mellis Depurati, oz. 1; Infusi Rosæ Acidi, ad fl. oz. 8. Mix.
In tonsillitis, after the acute stage, and in relaxed sore throat.

249. Zinc and Rhatany Gargle.

℞. Zinci Sulphatis, gr. 20; Syrupi Mori, fl. drs. 4; Glycerini, fl. oz. 1; Infusi Krameriæ, ad fl. oz. 8. Mix.
For relaxation of the uvula and fauces.

250. Borax Gargles.

℞. Boracis, gr. 160; Tincturæ Myrrhæ, fl. oz. 1; Aquæ, ad fl. oz. 8. Mix.
Useful in aphthæ and ulcerations about the fauces.

℞. Boracis, gr. 120; Glycerini, fl. oz. 1. Mix. To be painted over the gums, tongue, &c., with a camel's-hair pencil.
In aphthæ. It is preferable to the officinal BORAX HONEY, as the sugar of the latter favors the formation of fungi.

℞. Boracis, gr. 60; Glycerini, fl. drs. 12; Aquæ Rosæ, ad fl oz. 4 Mix.
To be painted over the tongue in some forms of ulceration, fissure, &c.

℞. Boracis, gr. 180; Syrupi Scillæ, fl. drs. 1; Aquæ, ad fl. oz. 8. Mix.
As a gargle in chronic inflammation of the fauces.

251. Tannin Gargle.

℞. Acidi Tannici, gr. 20; Spiritûs Vini Gallici, fl. oz. 1; Aquæ Camphoræ, ad fl. oz. 8. Mix. The officinal TANNIC ACID LOZENGES may be used at the same time.

252. Alum Gargles.

℞. Aluminis Exsiccati, gr. 80; Tincturæ Myrrhæ, fl. oz. 1; Aquæ, ad fl. oz. 8. Mix.

In mercurial salivation, ulceration about the mouth and fauces, &c.

℞. Aluminis Exsiccati, gr. 60; Tincturæ Capsici, fl. drs. 3; Syrupi Mori, fl. oz. 1; Aquæ Rosæ, ad fl. oz. 8. Mix.

In hoarseness, sore throat, &c., with relaxation of the uvula or tonsils.

253. Opium and Belladonna Gargle.

℞. Tincturæ Opii, fl. drs. 2; Tincturæ Belladonnæ, fl. drs. 3; Aquæ Camphoræ, ad fl. oz. 8. Mix.

To be used frequently in acute tonsillitis.

254. Chlorinated Soda Gargle.

℞. Liquoris Sodæ Chloratæ, fl. drs. 6; Aquæ, ad fl. oz. 8. Mix.

In ulcerated sore throats, profuse salivation, &c It may also be used as a lotion to foul gangrenous ulcers, as well as to the seat of irritation in prurigo.

255. Creasote Gargles.

℞. Creasoti, min. 20; Mucilaginis Tragacanthæ, fl. oz. 3; Aquæ, ad fl. oz. 8. Mix.

℞. Creasoti, min. 20; Tincturæ Lavandulæ, Compositæ, Tincturæ Myrrhæ, ää fl. drs. 4; Syrupi Limonis, fl. drs. 12; Aquæ, ad fl. oz. 8. Mix.

In chronic inflammation of the throat, dysphonia clericorum, &c.

256. Corrosive Sublimate Gargles.

℞. Hydrargyri Perchloridi, gr. 2; Acidi Nitrici Diluti, min. 30; Tincturæ Myrrhæ, fl. oz. 1; Aquæ Destillatæ, ad fl. oz. 8. Mix.

℞. Hydrargyri Perchloridi, gr. 3; Glycerini, fl. oz. 1; Extracti Conii, gr. 60; Aquæ Destillatæ, ad fl. oz. 8. Mix.

Useful in syphilitic affections of the tongue and throat. The patient must use one tablespoonful at a time, and should be cautioned against swallowing it.

257. Permanganate of Potash Gargle.

℞. Liquoris Potassæ Permanganatis, fl. oz. 1; Potassæ Chloratis, gr. 100; Aquæ Destillatæ, ad fl. oz. 8. Mix.

In diphtheria, ulceration of fauces, &c.

258. Sulphite of Soda.

℞. Sodæ Sulphitis, gr. 60; Aquæ Destillatæ, fl. oz. 1. Mix. To be frequently applied by means of a camel's-hair pencil to the mucous membrane of the mouth and fauces.

In cases of aphthæ.

259. Iodine Inhalation.

℞. Tincturæ Iodi, min. 30; Aquæ Calidæ, fl. oz. 4. Mix. The vapor is to be cautiously inhaled.

In some cases of laryngeal phthisis, diphtheria, &c.

In *severe coryza* great relief is given by holding a small bottle of Tincture of Iodine under the nose. The warmth of the hand suffices to vaporize the iodine.

260. Turpentine and Creasote Inhalations.

℞. Olei Terebinthinæ, fl. oz. 1; Aquæ Calidæ, ad fl. oz. 6. Mix.

In chronic bronchitis, with excessive secretion. To be used with a common inhaler.

℞. Creasoti, min. 30; Aquæ Bullientis, fl. oz. 8. Mix.
In ozæna and other affections of the nostrils, pharynx, &c.

261. Hydrocyanic Acid Inhalations.

℞. Acidi Hydrocyanici Diluti, min. 20; Tincturæ Hyoscyami, Tincturæ Lupuli āā fl. oz. 1; Aquæ Calidæ, ad fl. oz. 8. Mix.
In phthisis, ulceration of the larynx, &c. Can be used with any common inhaler.

℞. Acidi Hydrocyanici Diluti, min. 15; Spiritûs Chloroformi, fl. drs. 3—6; Aquæ Bullientis, fl. oz. 8. Mix.
In laryngitis, œdema of the glottis, &c.

262. Atomized Fluids for Inhalation.

The following drugs may be used in the form of spray. The dose mentioned is to be added to one ounce of water:

Acidum Carbolicum,	grs. 1 to 2	Hydrargyri Perchloridum,	gr. $\frac{1}{8}$ to $\frac{1}{4}$
Acidum Sulphurosum,	fl. drs. 2 to 8	Liquor Arsenicalis,	min. 3 to 8
Acidum Tannicum,	grs. 3 to 12	Liquor Calcis Saccharatus,	fl. drs. 1 to 4
Alumen Exsiccatum,	grs. 3 to 20	Oleum Terebinthinæ,	min. 1 to 5
Aqua Laurocerasi,	min. 5 to 20	Potassæ Chloras,	grs. 5 to 10
Argenti Nitras,	grs. 1 to 8	Potassæ Permanganas,	grs. 2 to 4
Borax,	grs. 5 to 20	Potassii Bromidum,	grs. 2 to 10
Extractum Belladonnæ,	gr. $\frac{1}{4}$ to 1	Potassii Iodidum,	grs. 2 to 10
Extractum Conii,	grs. 5 to 10	Sodii Chloridum,	grs. 5 to 40
Extractum Cannabis Indicæ,	gr. $\frac{1}{4}$ to 1	Tinctura Ferri Perchloridi,	min. 5 to 30
Extractum Opii,	gr. $\frac{1}{4}$ to 2	Tinctura Iodi,	min. 1 to 15
Ferri Ammonio-Sulphas,	grs. 3 to 6	Tinctura Opii,	min. 3 to 20
		Zinci Sulphas,	grs. 3 to 15

The best instruments for dispersing the finest spray are,—Dr. Siegle's, in which steam is applied as the dispersing medium: a modification of this apparatus, made by Krohne and Seseman, of 241 Whitechapel Road: Dr. Bergson's or Dr. Andrew Clarke's double handball spray-producer; Mr. Maunder's single handball.

Atomized medicated fluids may be advantageously used in affections of the lining membrane of the nose, mouth, and fauces. In croup, and diphtheria: Syphilitic affections of palate and throat: Laryngitis: Tonsillitis: Œdema of the glottis: Tubercular or syphilitic ulcerations of larynx: Hoarseness and loss of voice: Hooping-cough: Asthma: Hæmoptysis: Bronchitis: Phthisis. During their application the patient should make deep and long inspirations and expirations. Except in acute cases one application daily will suffice. In addition to the drugs mentioned above, pure glycerin may be used; or olive oil, or even cod-liver oil; or plain warm water; or the undiluted sulphurous acid (in diphtheria).

XIII. LOTIONS, LINIMENTS, COLLYRIA, AND OINTMENTS.

263. Hydrocyanic Acid Lotions.

℞. Acidi Hydrocyanici Diluti, fl. drs. 3; Plumbi Acetatis, gr. 60; Spiritûs Rectificati, fl. oz. 1; Aquæ Sambuci, ad fl. oz. 8. Mix.
In impetigo, prurigo, &c.

℞. Liquoris Potassæ, fl. drs. 2; Acidi Hydrocyanici Diluti, fl. drs. 1½; Glycerini, fl. oz. 1; Aquæ Rosæ, ad fl. oz. 8.
In some cases of pityriasis.

℞. Liquoris Ammoniæ Acetatis, fl. oz. 1; Acidi Hydrocyanici Diluti, fl. drs. 1½; Infusi Tabaci (made with sixty grains of Bird's-eye tobacco), ad fl. oz. 8. Mix. To be sponged twice or thrice daily over the seat of irritation.
In pruritus about the anus, vulva, &c.

℞. Hydrargyri Perchloridi, gr. 3; Acidi Hydrocyanici Diluti, fl. drs. 2; Misturæ Amygdalæ, ad fl. oz 8. Mix.
To check irritation in prurigo and other skin diseases of limited extent.

264. Astringent Lotions.

℞. Glycerini, fl. oz. 1; Liquoris Plumbi Subacetatis, fl. drs. 2; Spiritûs Rectificati, fl. drs. 4; Aquæ Rosæ, ad fl. oz. 8. Mix.
In eczema, ecthyma, pityriasis, &c.

℞. Zinci Sulphatis, gr. 16; Spiritûs Rosmarini, Tincturæ Lavandulæ Compositæ, ää fl. drs. 2; Aquæ, ad fl. oz. 8. Mix.
The common "Red Lotion" of hospitals. Very useful for strumous and other ulcers.

℞. Potassæ Chloratis, gr. 80; Aquæ, fl. oz. 8. Mix.
For many ill-conditioned ulcers.

℞. Acidi Citrici, gr. 120; Aquæ, fl. oz. 8. Mix.
For cancerous sores. Also as a gargle in cancer of the tongue or tonsil. It relieves pain, and encourages cicatrization.

265. Anodyne Lotions.

℞. Tincturæ Aconiti, fl. drs. 12; Aquæ, ad fl. oz. 4. Mix.
In acute superficial pain, hyperæsthesia of skin, gout, pruritus, &c.

℞. Tabaci Communis (Bird's-eye tobacco), gr. 120; Aquæ Bullientis, O. 1. Infuse for an hour, and strain. To be freely used in pruritus of the vulva or anus.

℞. Tincturæ Belladonnæ, fl. oz. 1; Spiritûs Chloroformi, fl. oz. 2; Aquæ Destillatæ, ad fl. oz. 8. Mix.

℞. Extracti Belladonnæ, gr. 120; Glycerini, fl. oz. 1. Mix.
To be painted over the seat of pain in neuralgic diseases, and in limited inflammations. The mixture is to be made of double this strength, if required as an application to the breast to check the secretion of milk.

266. Alkaline and Anodyne Lotions.

℞. Liquoris Morphiæ Hydrochloratis, fl. oz. 1½; Liquoris Potassæ, fl. drs. 2; Glycerini, fl. oz. 1; Aquæ Laurocerasi, fl. oz. 1; Aquæ Sambuci, ad fl. oz. 12. Mix.
For the relief of pruriginous affections.

℞. Potassæ Sulphuratæ, gr. 90; Liquoris Potassæ, min. 80; Tincturæ Aconiti, fl. drs. 4; Aquæ Destillatæ, ad fl. oz. 12. Mix.

267. Acid and Anodyne Lotion.

℞. Acidi Acetici, fl. drs. 1½; Morphiæ Acetatis, gr. 10; Vini Colchici, fl. oz. 3. Mix.
To be applied over the inflamed joint in gout, on a piece of lint covered with oiled silk.

268. Borax or Soda, and Glycerin Lotions.

℞. Boracis, gr. 60—120; Glycerini, fl. oz. 1; Aquæ Sambuci, ad fl. oz. 8. Mix.
An excellent local palliative in many of the squamous diseases of the skin.

℞. Boracis, gr. 200; Morphiæ Hydrochloratis, gr. 10; Glycerini, fl. oz. 1; Aquæ Rosæ, ad fl. oz. 8. Mix.
In obstinate pruritus of the vulva. The parts to be sponged twice or thrice in the twenty-four hours with this lotion, previously washing them with glycerin (or honey) soap and warm water.

℞. Sodæ Carbonatis, gr. 120; Aquæ Sambuci, fl. oz. 7; Glycerini, fl. oz. 1. Mix.
To allay the itching attendant on many skin diseases, healing ulcers, &c.

269. Iodine Lotions.

℞. Tincturæ Iodi, fl. oz. 1; Glycerini, fl. drs. 12; Aquæ Destillatæ, ad fl. oz. 8. Mix.
For indolent and scrofulous ulcers, &c.

℞. Linimenti Iodi, fl. drs. 4; Tincturæ Aconiti, fl. oz. 1; Aquæ Destillatæ, ad fl. oz. 8. Mix.
In some cases of chronic peritonitis; chronic pleurisy with effusion; chronic effusions into joints, &c. See F. 81.

270. Creasote or Carbolic Acid, and Glycerin.

℞. Creasoti, min. 35; Glycerini, fl. drs. 12; Aquæ, ad fl. oz. 8. Mix, for a lotion.
In pityriasis, &c.

℞. Acidi Carbolici, gr. 100; Glycerini, fl. oz. 1; Aquæ, ad fl. oz. 8. Mix, for a lotion.
In parasitic and pruriginous affections.

℞. Glycerini Acidi Carbolici, fl. oz. 1; Aquæ, fl. drs. 4. Mix. The affected part to be sponged with this lotion three or four times in the twenty-four hours.
In all parasitic skin diseases.

271. Corrosive Sublimate Lotions.

℞. Hydrargyri Perchloridi, gr. 8—16; Aquæ Sambuci, fl. oz. 8. Mix.
Useful in tinea favosa, and other parasitic skin diseases.

℞. Hydrargyri Perchloridi, gr. 10; Ammonii Chloridi, gr. 60; Acidi Hydrocyanici Diluti, min. 100; Liquoris Morphiæ Hydrochloratis, fl. oz. 2. Mix. Label, "One teaspoonful to be added to a wineglassful of water to form a lotion."
In pruritus of the vulva or anus.

℞. Hydrargyri Perchloridi, gr. 4; Acidi Nitrici Diluti, min. 30; Spiritûs Vini Rectificati, fl. drs. 4; Aquæ Sambuci, ad fl. oz. 8. Mix and label,—"To be sponged upon the spots and rough surfaces night and morning."
In chloasma, some forms of acne, &c.

272. Sulphurous Acid Lotion, &c.

℞. Acidi Sulphurosi, fl. oz. 2; Aquæ Destillatæ, fl. oz. 6. Mix.
In skin diseases dependent on a parasitic plant.

℞. Acidi Sulphurosi, Glycerini, ää fl. oz. 1. Mix.
In ringworm, favus, and for the destruction of parasitic lichens.
Should be painted over the affected parts.

273. Cold Lotions.

℞. Liquoris Ammoniæ Acetatis, fl. oz. 1; Spiritûs Rectificati, fl. oz. 2; Aquæ Rosæ, ad fl. oz. 8. Mix.
As an evaporating lotion in inflammation of the membranes of the brain. To be applied after the scalp has been shaved.

℞. Ammonii Chloridi, oz. ½; Spiritûs Rectificati, fl. oz. 1; Acidi Acetici Diluti, fl. drs. 12; Aquæ, ad fl. oz. 8. Mix.

274. Absorbent Lotions.

℞. Zinci Oxidi, gr. 160; Aquæ Rosæ, ad fl. oz. 8. Mix.
Useful in impetigo, eczema, &c.

℞. Zinci Oxidi, gr. 160; Mucilaginis Tragacanthæ, Aquæ Destillatæ, ää fl. oz. 4. Mix.

275. Solutions of Arnica.

℞. Tincturæ Arnica, fl. drs. 1—6; Aquæ Destillatæ, ad fl. oz. 8. Mix.
As a lotion in sprains, contusions, and burns.

℞. Tincturæ Arnicæ, fl. drs. 2; Tincturæ Belladonnæ, fl. oz. 1; Linimenti Saponis, ad fl. oz. 8. Mix, for an embrocation.

276. Mercurial Liniments.

℞. Linimenti Hydrargyri, fl. oz. 2; Linimenti Belladonnæ, Linimenti Opii, āā fl. oz. 1. Mix.
In syphilitic tubercles, nodes, &c.

℞. Hydrargyri Perchloridi, gr. 6; Acidi Nitrici Diluti, min. 90; Aquæ Laurocerasi, fl. drs. 2; Glycerini, fl. oz. 1; Aquæ Destillatæ, fl. oz. 8. Mix.
To be used every night in cases of chloasma, syphilitic nodes and eruptions, &c.

℞. Unguenti Hydrargyri, oz. 1; Glycerini, fl. oz. 1; Iodi, gr. 120; Olei Olivæ, fl. oz. 2. Mix.
To be gently rubbed over syphilitic nodes.

277. Rubefacient Liniment.

℞. Pulveris Capsici, gr. 30; Olei Macis, min. 30; Linimenti Terebinthinæ, fl. oz. 3; Linimenti Camphoræ Compositi, ad fl. oz. 8. Mix.
As a liniment to the chest in some cases of bronchitis.

278. Stimulating Liniment.

℞. Linimenti Saponis, Linimenti Opii, Linimenti Camphoræ Compositi, āā fl. oz. 1; Tincturæ Arnicæ, fl. drs. 2. Mix.
To be applied round the throat, on a strip of flannel, in subacute tonsillitis, common sore throat, &c.

279. Camphor Liniment and Opium, &c.

℞. Linimenti Camphoræ Compositi, fl. oz. 2; Tincturæ Opii, Tincturæ Belladonnæ, āā fl. drs. 4. Mix.
To be rubbed over the scrobiculus cordis to check obstinate nausea and vomiting, pain, &c.

280. Iodide of Potassium Liniment.

℞. Potassii Iodidi, *vel* Ammonii Iodidi, gr. 40; Aquæ, fl. drs. 4. Mix, and add Glycerini, fl. oz. 1.
Useful in some glandular enlargements, as well as for dispersing the chalkstones of gout.

281. Belladonna and Aconite Liniment.

℞. Linimenti Belladonnæ, Linimenti Aconiti, āā fl. drs. 4; Linimenti Camphoræ Compositi, fl. oz. 3. Mix. The seat of pain to be rubbed with this liniment for ten minutes at bedtime.
In pleurodynia, chronic rheumatism, and painful nervous affections.

For the same class of cases a good liniment may be made with one part of belladonna liniment, one of opium liniment, and four of turpentine liniment.

℞. Linimenti Belladonnæ, fl. drs. 3; Glycerini, fl. drs. 5; Linimenti Saponis, fl. oz. 2. Mix. The spine to be rubbed with this liniment night and morning for five minutes.
In hooping-cough.
May be used for a child five years old.

282. Chloroform, Belladonna, and Aconite Liniment.

℞. Linimenti Chloroformi, Linimenti Aconiti, Linimenti Belladonnæ, Linimenti Opii, āā fl. drs. 4; Linimenti Saponis, fl. oz. 2. Mix. To be rubbed into the painful part night and morning.
In neuralgic and rheumatic pains of great severity.

283. Cod-Liver Oil Embrocations.

℞. Olei Morrhuæ, fl. drs. 14; Spiritûs Ammoniæ Aromatici, fl. oz. 1; Tincturæ Opii, fl. drs. 2; Olei Lavandulæ, min. 30. Mix. One-half to be well rubbed over the chest and abdomen, night and morning.

In phthisis and other cases where the use of cod-liver oil is indicated, but where the stomach will not bear it.

℞. Olei Morrhuæ, fl. oz. 1; Olei Cajuputi, fl. drm. 1. Mix. To be rubbed over the chest at bedtime.

The cajuput oil well disguises the smell of this embrocation.

284. Caoutchouc Solution.

Take some thin pieces of India-rubber, or of pure gutta percha, and dissolve them in chloroform. A good protective solution.

To be painted over superficial excoriations, threatened bed-sores, &c.

285. Collodium Paints.

℞. Collodii, fl. oz. 1; Olei Palmæ, min. 20; Anchusæ Radicis, sufficient to give color. A good artificial cuticle which, when spread on the skin, will not crack, may also be formed by mixing two parts of glycerin with one hundred of collodion. The officinal COLLODIUM FLEXILE consists of one fluid drachm of castor oil, one hundred and twenty grains of Canada balsam, and six fluid ounces of collodion.

Either preparation may be used as a varnish in various cutaneous affections, excoriations, or superficial burns.

℞. Collodii Flexilis, fl. drs. 4; Morphiæ Acetatis, gr. 5—20. Mix.

To be painted over the course of the affected nerve in neuralgia.

286. Glycerin and Lime-water, &c.

℞. Glycerini, fl. oz. 1; Pulveris Tragacanthæ Compositi, gr. 120; Mellis Depurati, gr. 120; Liquoris Calcis Saccharati, fl. oz. 1½; Misturæ Amygdalæ, ad fl. oz. 8. Mix.

A good bland embrocation in cases of herpes, superficial burns, chapped hands, excoriations, &c.

The officinal LINIMENTUM CALCIS, consisting of equal parts of olive oil and lime-water, is also useful in some of the above-mentioned cases. For chapped hands the GLYCERIN OF STARCH is an excellent preparation.

℞. Linimenti Aconiti, fl. drs. 2; Linimenti Calcis, fl. drs. 10. Mix.

In vulval pruritus.

℞. Acidi Carbolici, gr. 60—120; Linimenti Calcis, fl. oz. 8. Mix.

To prevent suppuration in burns, &c.

287. Ammonia and Cantharides, &c.

℞. Spiritûs Ammoniæ Aromatici, Spiritûs Rosmarini, Glycerini, ää fl. oz. 1; Tincturæ Cantharidis, fl. drs. 3—6; Aquæ Rosæ, ad fl. oz. 8. Mix.

To be gently brushed into the scalp night and morning, when the hair is falling off after fever or any severe illness.

A more elegant embrocation may be made by adding two fluid drachms of Tincture of Cantharides to two ounces of Eau de Cologne.

℞. Balsami Tolutani, gr. 120; Olei Rosmarini, min. 20; Tincturæ Cantharidis, fl. drs. 4; Olei Ricini, fl. oz. 1; Adipis Præparati, oz. 1. Mix.

A valuable pomade in cases of baldness following ringworm, pityriasis, or tinea decalvans. It should be brushed into the scalp night and morning.

288. Sulphate of Atropia.

℞. Atropiæ Sulphatis, gr. 1; Aquæ Destillatæ, fl. drs. 4. Mix.

Dilatation of the pupil is effected most speedily and is longest maintained by a solution of this kind. A full drop must be placed in the eye by means of a camel's-

hair pencil; the effect will be produced in from fifteen to twenty minutes, and will sometimes continue for seven or eight days.

The officinal LIQUOR ATROPIÆ SULPHATIS contains half a grain of the salt in each drachm. It is preferable to the Liquor Atropiæ for ophthalmic purposes; inasmuch as the spirit which is used in the latter to keep the alkaloid in solution causes considerable pain to the eyes when it is applied.

Disks of gelatin impregnated with atropin are prepared according to the instructions of Mr. Ernest Hart and Mr. Streatfeild. These disks dissolve and act very efficiently when placed in contact with the moist conjunctiva. A piece, one-fifth of an inch square, contains as much of the Sulphate of Atropin as a drop of the solution of two grains to the ounce of water.

289. Alum Coagulum.

Take the whites of two eggs and shake them with fragments of alum to form a coagulum.

Useful when painted under the eyelid to produce contraction in trichiasis, entropion, &c.

290. Sedative Collyria.

℞. Extracti Belladonnæ, gr. 2—4; *vel* Extracti Opii, gr. 2—5; *vel* Morphiæ Hydrochloratis, gr. 1—2; *vel* Acidi Hydrocyanici Diluti, min. 10; *vel* Tincturæ Aconiti, min. 5—30; Aquæ Destillatæ, fl. oz. 1. Mix.

291. Astringent Collyria.

℞. Zinci Sulphatis, gr. 2—4; *vel* Aluminis Exsiccati, gr. 1—4; *vel* Tincturæ Arnicæ, min. 5—30; *vel* Cupri Sulphatis, gr. 1—4; *vel* Argenti Nitratis, gr. 1—4; *vel* Liquoris Plumbi Subacetatis, min. 10; *vel* Cadmii Sulphatis, gr. 1—3; Aquæ Destillatæ, fl. oz. 1. Mix.

℞. Zinci Oxidi, gr. 60; Aquæ Rosæ, fl. oz. 8. Mix. For an eye-water, to be used night and morning.

292. Iodide of Potassium Collyrium.

℞. Potassii Iodidi, gr. 6—8; Aquæ Destillatæ, fl. oz. 1. Mix.

To remove stains of nitrate of silver from the conjunctiva.

293. Iodide of Lead Ointments.

℞. Plumbi Iodidi, gr. 60; Unguenti Atropiæ, gr. 60—120 (each ounce contains eight grains of the alkaloid); Unguenti Simplicis, ad oz. 1. Mix.

In some malignant indurations.

℞. Plumbi Iodidi, gr. 90; Unguenti Cetacei, oz. 1; Linimenti Belladonnæ, *vel* Linimenti Aconiti, fl. drm. 1. Mix.

For malignant and painful strumous ulcers.

294. Sulphate of Zinc Ointment.

℞. Zinci Sulphatis Exsiccatæ, gr. 120; Unguenti Simplicis, oz. 1. Mix.

Very useful in some forms of Lupus, rodent ulcer, &c. The officinal ALUMEN EXSICCATUM may be employed in the same cases.

295. Tar and Citrine Ointment.

℞. Unguenti Picis Liquidæ, oz. 1½; Unguenti Cetacei, oz. 1; Unguenti Hydrargyri Nitratis, oz. ½. Mix.

In lepra, psoriasis, chronic eczema, &c.

296. Aconitin Ointments.

℞. Unguenti Aconitiæ, oz. ½ (= to grs. 2 of the alkaloid); Unguenti Hydrargyri Subchloridi, oz. 1—2. Mix.

In some forms of neuralgia.

℞. Unguenti Aconitiæ, gr. 120.
In severe neuralgia. A small portion is to be painted over the nerve, but it must not be used where there is the slightest abrasion.

297. Belladonna and Opium.

℞. Extracti Belladonnæ, Extracti Opii, āā gr. 60; Aquæ Laurocerasi, fl. drs. 4; Extracti Papaveris, oz. 3. Mix.
To be painted over the seat of inflammation in pleurisy, peritonitis, gout, gastric disease, &c. A fomentation flannel, or hot linseed poultice, or wet compress, is to be applied; being separated from the extracts by a sheet of tissue-paper.

℞. Extracti Belladonnæ, gr. 120; Extracti Papaveris, oz. 2; Syrupi Papaveris, fl. oz. 1. Mix and label,—"To be painted over the seat of pain, which is then to be covered with water-dressing or a bread-and-water poultice. Poison."
For inflammation of the absorbents, lymphatic glands, gallstone disease, peritonitis, &c.

298. Mercurial and Belladonna Ointments.

℞. Unguenti Hydrargyri, gr. 10; Unguenti Atropiæ, gr. 30.
For relieving cases of severe nocturnal pain around the orbit. It is to be rubbed into the temple just before the pain may be expected.

℞. Linimenti Belladonnæ, fl. drs. 2; Unguenti Hydrargyri Subchloridi, oz. 1. Mix.
In syphilitic tubercular diseases.

299. Corrosive Sublimate Ointment.

℞. Hydrargyri Perchloridi, gr. 5; Unguenti Simplicis, oz. 1. Mix.
In parasitic diseases of the skin or scalp. Especially useful in ringworm. May be used as a pomatum, with a drop or two of otto of roses to perfume it, in scalp diseases where the presence of a parasitic fungus is feared.

300. Ammoniated Mercury and Sulphur.

℞. Unguenti Hydrargyri Ammoniati, gr. 120; Unguenti Sulphuris, gr. 360. Mix.
A good antiparasitic ointment.

301. Creasote and Red Oxide of Mercury.

℞. Creasoti, min. 10; Unguenti Hydrargyri Oxidi Rubri, gr. 120; Unguenti Simplicis, gr. 360. Mix.
In parasitic diseases of the skin, the ulcerations of rupia, &c.

302. Red Iodide of Mercury Ointment.

℞. Hydrargyri Iodidi Rubri, gr. 8; Unguenti Simplicis, oz. 1. Mix.
In chronic glandular tumors, a small portion rubbed in every night proves very useful. The officinal ointment is double the strength of the foregoing, and hence it causes pain and blistering.

303. Croton Oil and Lard.

℞. Olei Crotonis, min. 15; Adipis Præparati, oz. ½. Mix. One-fourth part to be rubbed into the skin every eight hours, until an abundant pustular eruption is produced.
Useful as a counter-irritant.

304. Veratria Ointment.

℞. Unguenti Veratriæ, Unguenti Cadmii Iodidi, āā oz. 1. Mix.
In chronic rheumatism, chronic gout, &c.

305. Diluted Citrine Ointment.

℞. Unguenti Hydrargyri Nitratis, gr. 40—120; Unguenti Cetacei, gr. 240. Mix.
As a stimulant and alterative in chronic skin diseases. May be applied to the edges of the eyelids in ophthalmia to prevent their adhering at night.

306. Compound Spermaceti Ointments.

℞. Acidi Hydrocyanici Diluti, fl. drm. 1; Unguenti Atropiæ, gr. 120; Unguenti Cetacei, oz. 1. Mix.
In cutaneous diseases attended with pain and itching.

℞. Balsami Peruviani, gr. 60; Unguenti Cetacei, oz. 1. Mix.
In slight excoriations.

℞. Balsami Peruviani, gr. 60; Unguenti Cetacei, oz. 2; Alkannæ Tinctoriæ Radicis, gr. 60; Olei Rosæ (Otto of Roses), min. 10. Mix.
Useful as a lip-salve and as an application to chapped hands and sore nipples.

307. Belladonna and Iodide of Potassium.

℞. Linimenti Belladonnæ, fl. drs. 2; Unguenti Potassii Iodidi, oz. 1. Make an ointment. The Liniment of Aconite may be substituted for the Belladonna, if desired.
In painful chronic tumors, neuralgia, &c.

308. Iodine and Cod-Liver Oil Ointment.

℞. Unguenti Iodi, Olei Morrhuæ, āā fl. drs. 4. Mix.
Useful when rubbed upon the throat in bronchocele; as well as when applied to strumous glands, unsuppurating buboes, and the tumid bellies of children with mesenteric disease.

309. Bole Armeniac and Lead.

℞. Boli Armenæ Rubræ, Plumbi Oxidi Semivitrei, āā gr. 30; Camphoræ gr. 5; Ceræ Flavæ, gr. 180; Adipis Præparati, gr. 360. Mix. To be spread on thick linen.
Several German physicians speak of this as an efficacious application for preventing and curing bed-sores.

310. Compound Sulphur Ointments.

℞. Unguenti Creasoti, Unguenti Sulphuris, āā oz. ½. Mix.
In pityriasis, and some other chronic cutaneous affections.

℞. Sulphuris Iodidi, gr. 12; Unguenti Simplicis, oz. 1. Mix.
In acne, applied thrice daily. The officinal iodide of sulphur ointment is one-third stronger.

℞. Sulphuris Iodidi, gr. 12; Sulphuris Præcipitati, gr. 20; Olei Amygdalæ Amaræ, min. 5; Adipis Præparati, oz. 1. Mix.

311. Bismuth and Morphia Ointment.

℞. Bismuthi Subnitratis, oz. 1; Morphiæ Acetatis, gr. 6; Adipis Benzoati, oz. 8. Mix.
For irritable ulcers and eruptions, piles, &c.

312. Iodide of Cadmium Ointment.

℞. Cadmii Iodidi, gr. 60; Adipis Præparati, oz. 1; Linimenti Aconiti, fl. drs. 2. Mix.
Superior to iodide of potassium ointment for rubbing into tender and enlarged strumous glands, nodes, &c.

℞. Unguenti Cadmii Iodidi, oz. 2; Unguenti Atropiæ, oz. 1. Mix.
To be rubbed into painful strumous and glandular swellings.

XIV. NARCOTICS AND SEDATIVES.

313. Anæsthetics.

The chief Anæsthetics which have hitherto been used in the practice of medicine are chloroform, ether, and nitrous oxide. As the employment of one or other of these agents is often indicated in calculous nephralgia, gallstone colic, some cases of cancer, neuralgia, maniacal delirium, convulsions, the paroxysmal dyspnœa of infantile laryngismus and diphtheria and croup, as well as in spasmodic diseases generally, a few words on their mode of administration may not be out of place.

The principal advantages of inhalation are these: That by means of the immense surface offered by the air-cells of the lungs for absorption, a deeper and more rapid effect is induced than it would be safe or easy to effect by other means. At the same time, the digestive functions are less interfered with than when narcotics are given in the ordinary way.

In every form of inhalation (with the exception of the nitrous oxide) the anæsthetic should be freely diluted with common air, and no attempt made to produce rapid narcotism; while the breathing ought to be allowed to go on quietly and naturally. The patient should be tranquil, fearless, and usually in the recumbent posture. If false teeth are worn, they are to be removed; since if there be any struggling, or sickness, or cough, the plate may become separated from the gums and be drawn into the pharynx, or may get to the back of the fauces and produce asphyxia by pressing on the glottis. And then the administrator of the narcotic agent, while watching the respiration and the countenance, had better also keep his finger on the pulse. For if the breathing becomes stertorous, or if there is evidence that the circulation is getting weak and faltering, the inhalation must be suspended.

Chloroform was introduced into practice by Sir James Y. Simpson, of Edinburgh, in November, 1847. The vapor of this hot, sweet, heavy liquid may be inhaled by individuals of all ages, from infants under one year to persons as old as ninety; and in almost all states of the system. The exceptional cases which preclude its employment, at all events in medical practice, are instances of marked blood poisoning, of far-advanced cardiac or pulmonary or cerebral disease, and perhaps of habitual drunkenness. It is best administered from an apparatus such as the late Dr. Snow recommended; though Sir James Simpson always uses a simple napkin folded into the shape of a funnel. A crumpled handkerchief in a tumbler forms a convenient inhaler. But in whatever way it is exhibited, care must be taken that it does not come into contact with the lips and nose; since it produces painful excoriations. Chloroform should also be given slowly and cautiously; and it acts best before breakfast, or when the patient's stomach is empty. If administered immediately after food sickness is sure to result. According to Dr. Snow, about four cubic inches of vapor, or rather more than five grains of chloroform to each hundred cubic inches of air, is the proportion most suitable for causing insensibility to surgical operations; but according to the Report of the Chloroform Committee of the Royal Medical and Chirurgical Society, the proportion of vapor should not exceed three and a half per cent. As a general rule, moreover, in medical and obstetric cases it need only be used in a more diluted form. When an overdose has been given, the patient should be made to inhale ether, as it counteracts the depressing action which chloroform exerts on the heart. Or artificial respiration, performed in the manner to be presently described, may be resorted to; the success of which will depend upon the extent to which the heart and the muscles of respiration have been paralyzed by the chloroform. When death occurs, it arises from the failure of the functions of respiration and circulation. Respiration generally ceases, and then the heart's action stops. Dr. Snow gave this anæsthetic in 4000 or more cases, with the loss of only one person while inhaling it; and amongst these were patients with heart disease, phthisis, and several who had suffered from apoplexy. It has been computed that during the Crimean war chloroform was administered 40,000 times, death resulting in only one case.

Æther (first used as an anæsthetic in September, 1846, by Dr. W. T. G. Morton, of Boston, Massachusetts) is thought to be a safer agent for inducing narcotism than chloroform; but although it is so, still it must be given with the same caution. About one fluid ounce is usually inhaled by an adult in becoming insensible; though not more than half this quantity is absorbed, the remainder being thrown back from the lungs, mouth, &c. An excellent anæsthetic for obstetric practice may be made with equal parts of ether and chloroform.

Amylene is made by distilling amylic alcohol (obtained from crude fusil oil or oil of potato spirit) with chloride of zinc. In the present state of our knowledge, it is not advisable to resort to this agent. Dr. Snow seems to have administered it in 238 cases, and to have had two deaths from it.

In October, 1867, Dr. Richardson recommended the use of the *Bichloride of Methylene* as a general anæsthetic. He did so on these grounds amongst others: (1.) The sleep produced by it is as deep as that by chloroform, but more natural and agreeable. (2.) The second degree of narcotism is shorter than with other anæsthetics. (3.) When the effects are fully developed, the narcotism is very prolonged and is easily reproduced. (4.) The final escape of the bichloride from the organism is rapid; hence the recovery from its influence is sudden. It rarely produces headache, sickness, or any sense of exhaustion. (5.) When it destroys life, it does so by equally paralyzing the organs of respiration and circulation. (6.) It combines with ether and with chloroform in all proportions. And indeed, in its properties generally, it seems to resemble a compound of these two agents.

Dr. Richardson has also shown that by saturating *Ether with Chloride of Methyl* an anæsthetic is formed. The product has, however, the disadvantage of not being a very stable compound; and hence he does not at present recommend its employment.

The *Tetrachloride of Carbon* has been employed for producing anæsthesia during surgical operations, for abolishing the pains of parturition, for the relief of neuralgia and hay fever and toothache, for the induction of sleep, as well as for subduing excessive palpitation of the heart. Dr. Sansom says that amylene and the tetrachloride of carbon have an analogous action. He does not recommend the latter where such anæsthesia as is necessary for a surgical operation is required; but thinks a mixture of six parts of chloroform and one of tetrachloride may prove valuable. The latter, in its pure state, can be used where it is only necessary to relieve pain without destroying consciousness; to this extent its action is that of a stimulant, anodyne, and hypnotic.

The inhalation of *Nitrous Oxide* to prevent the pain of surgical operations was suggested by Sir Humphry Davy in 1799, when he ascertained that its respiration produced effects analogous to those caused by drinking fermented liquors—usually a transient intoxication, or violent exhilaration. These effects were shown in popular lectures at the Adelaide Gallery, in London, somewhere about 1840. In 1844, Dr. Colton administered it to an American dentist, Horace Wells, and painlessly extracted one of his teeth. The introduction of ether inhalation by Dr. Morton, in 1846, withdrew professionial attention from the nitrous oxide. The latter has, however, again been introduced into practice, and is now (1869) being largely employed by dentists. Dr. Colton is said to have given it in twenty-eight thousand cases without an accident. The great advantages of this gas over other anæsthetics seem to be its safety; the fact that it induces insensibility in from 60 to 180 seconds; that the complete insensibility lasts for about half a minute; while in about a couple of minutes afterwards there is restoration to consciousness without any sickness or faintness. Nitrous oxide is inhaled undiluted with atmospheric air; when used mixed with air it causes a prolonged stage of exhilaration—whence it was known as "laughing gas."

An excellent anæsthetic, which has been very largely used by the author, can be made by mixing equal parts of pure *Chloroform and Ether*. No special apparatus is required for its employment; though the flannel mask recommended by Dr. Skinner, with the drop bottle, will be found convenient. The only precaution necessary is that there should be no impediment to the free admission of air. The Chloroform Committee of the Royal Medical and Chirurgical Society has recommended a mixture composed by measure of three parts of ether, two of chloroform, and one of alcohol. That this is safer than pure chloroform cannot be doubted; but it has seemed to the author less useful than this agent with an equal quantity of ether.

In apparent death from any anæsthetic *artificial respiration*, after the plan recommended by Dr. Silvester, ought to be tried. The body is to be laid on its back with the head and shoulders slightly raised. The mouth and nostrils are to be cleansed from mucus; and the tongue should be drawn firmly forwards so as to keep the tip well protruded at the side of the mouth. Then the operator is to compress, for two or three seconds, the front and sides of the chest by the patient's own arms. Thus the medicated vapor will be partly expelled from the lungs; while upon the pressure being suddenly removed, the elastic walls of the chest will expand, and give the primary impetus to respiration. To assist expansion to the utmost the ribs should be drawn upwards by means of the pectoral muscles. This is effected by the

operator grasping the arms just above the elbows, and drawing them upwards until they nearly meet above the head. Then they must be lowered, and replaced at the sides; at the same time making moderate pressure with them, for a couple of seconds, against the chest-walls. This process is to be repeated fifteen times in the minute. At the same time, the face ought to be well fanned. No attempt should be made to administer stimulants by the mouth.

In some instances, galvanism of the phrenic nerve, diaphragm, and intercostal muscles, would be useful in keeping up the movements of respiration; one pole of the battery being applied over the outer edge of the sterno-mastoid muscle just above the clavicle, while the other is pressed deeply into the seventh intercostal space. The diaphragm must be made to contract and relax alternately, by interrupting the currents at equal intervals.

While attempts are thus being made to oxygenate the blood, an assistant is to rub the limbs from the extremities towards the heart. If no respiratory efforts supervene the face and chest are to be dashed with cold water, or with hot and cold water alternately. When success follows this plan, the temperature of the body must be maintained by friction, hot blankets, the warm bath, &c.

314. Morphia, Atropin, Aconitin, &c., for Subcutaneous Injection.

The solution of *Acetate of Morphia* as used for injection under the skin can be well made by mixing ten grains of this salt with one fluid drachm of distilled water. It is necessary to rub up the salt with hot distilled water and acetic acid, subsequently neutralizing the latter with liquor potassæ. The solubility of the acetate of morphia in water is 1 in 6; of the hydrochlorate, 1 in 20.

Each six minims of a solution thus made will contain one grain of acetate of morphia. For first injections, not more than one minim and a half should be used: as it is certain that this narcotic acts more powerfully when thus employed than when taken into the stomach. In diseases which are continuously painful the ease given by an injection will last for about twelve hours. To relieve the suffering of advanced cancer, &c., the injection may be advantageously given, night and morning, for many months.

A solution of *Bimeconate of Morphia* for hypodermic injections, is prepared by Mr. Peter Squire. Each minim of this concentrated solution is equivalent to min. 16 of the officinal tincture of opium, or to one-sixth of a grain of acetate of morphia.

The subcutaneous injection of morphia often causes troublesome nausea and retching, which may continue for 18 or 20 hours. This unpleasant result can be obviated, according to Dr. John Harley, by administering a small quantity of atropin ($\frac{1}{96}$th of a grain) with the morphia.

The subcutaneous injection of *Atropin* is sometimes useful in cases of intestinal obstruction, asthma, tetanus, neuralgia, chorea in the adult, &c. Great caution is necessary: not more than two minims of the officinal Liquor Atropiæ (= to gr. $\frac{1}{60}$th), or of the Liquor Atropiæ Sulphatis, should be employed at first. During a severe paroxysm of asthma, the use of two minims of the liquor atropiæ mixed with the same quantity of the morphia solution will often produce satisfactory results. The good effect is increased in some cases by having recourse to this injection while the patient is unconscious from the inhalation of a mixture of ether and chloroform.

Chloroform may be used in the same manner. The injection of ten or fifteen minims often effects a cure for the time in pleurodynia, neuralgia, sciatica, &c. It has the disadvantage of sometimes producing an irritable ulcer, which may be slow in healing.

A solution of *Aconitin* may be made thus: Aconitiæ, gr. 1; Spiritûs Rectificati, min. 10; Aquæ Destillatæ, ad fl. drs. 2. Mix. For first injections not more than two minims should be employed: the dose may afterwards be safely increased to four minims (gr. 1-30). It is better, though not absolutely necessary, to make the injection at the seat of pain. The local tingling which follows is often severe; but this is of no consequence compared to the neuralgic pain for which it is used.

315. Morphia Draughts, &c.

℞. Liquoris Morphiæ Hydrochloratis, min. 30 (= to gr. ½ of the salt); Syrupi Limonis, fl. drm. 1; Tincturæ Hyoscyami, fl. drm. 1; Aquæ Camphoræ, fl. oz. 1. Mix. To be taken at bedtime.

In insomnia with pain.

℞. Liquoris Morphiæ Hydrochloratis, min. 15—30; Spiritûs Chloroformi, fl. drm. 1 (= to min. 8 of chloroform); Spiritûs Ætheris, min. 30; Tincturæ Belladonnæ, min. 20; Tincturæ Cardamomi Compositæ, fl. drm. 1; Aquæ, ad fl. oz. 1½. Mix. To be taken every two hours (the patient being watched) until the pain ceases.

Useful in facilitating the passage of gallstones.

℞. Liquoris Morphiæ Hydrochloratis, min. 40; Acidi Hydrocyanici Diluti, min. 20; Syrupi Scillæ, fl. drs. 6; Tincturæ Benzoini Compositæ, fl. oz. 1; Mucilaginis Acaciæ, ad fl. oz. 6. Mix. One tablespoonful every three or four hours.

In many irritable coughs.

316. Chloroform and Opium.

℞. Chloroformi, min. 5—10; Extracti Opii Liquidi, min. 15—30; Tincturæ Belladonnæ, min. 10—20; Syrupi Rhœados, fl. drm. 1; Mucilaginis Tragacanthæ, fl. oz. 1. Mix, for a night draught.

In severe colic and other spasmodic disorders.

317. Morphia, Chloroform, and Indian Hemp.

℞. Liquoris Morphiæ Hydrochloratis, min. 20; Tincturæ Chloroformi Compositæ, min. 30; Tincturæ Cannabis Indicæ, min. 20; Pulveris Tragacanthæ Compositi, gr. 30; Spiritûs Ætheris, min. 40; Acidi Hydrocyanici Diluti, min. 4; Tincturæ Hyoscyami, fl. drm. 1; Aquæ, ad fl. drs. 12. Mix, for a night draught.

In many chronic diseases attended with pain or restlessness.

The medicine called CHLORODYNE probably consists essentially of chloroform, Indian hemp, morphia, and hydrocyanic acid. In the Canada Lancet (October 15th, 1864), Dr. W. E. Bowman gives the following formula for its preparation: Take of Chloroform, half a fluid ounce; Sulphuric Ether, ninety minims; Oil of Peppermint, eight drops; Resin of Indian Hemp, six grains; Capsicum, two grains. Mix, shake occasionally, and allow it to stand for a few days. Take of Muriate of Morphia sixteen grains, dissolved by the aid of heat in two fluid drachms of water; to which when cold, add of Scheele's Hydrocyanic Acid, sixty-five minims; Perchloric Acid, one fluid drachm; Treacle, two fluid ounces. Add this gradually to the first mixture, and then make the whole measure four fluid ounces by the addition of treacle or water. Each dose of thirty minims contains of chloroform min. 4, ether min. 1½, extract of hemp, gr. $\frac{1}{10}$th, hydrochlorate of morphia, gr. ¼, and of Scheele's acid, min. 1.

318. Brandy and Egg Mixture, with Opium.

℞. Misturæ Spiritûs Vini Gallici (see F. 17) fl. oz. 1; Extracti Opii Liquidii, min. 5—10; Spiritûs Chloroformi, min. 30. Mix. To be taken every four hours.

In exhaustion from pain.

319. Tolu and Camphorated Opium.

℞. Tincturæ Tolutanæ, fl. drs. 2; Syrupi Tolutani, fl. oz. 1; Tincturæ Camphoræ Compositæ, fl. drs. 4 (= to gr. 1 of opium); Mucilaginis Tragacanthæ, ad fl. oz. 8. Mix. Two tablespoonfuls three times a day.

For old people, where the mucous secretion from the bronchi is excessive.

320. Cimicifuga Racemosa, or Black Snakeroot.

℞. Tincturæ Actææ Racemosæ, min. 30—fl. drs. 2; Aquæ, ad fl. oz. 1. Mix, for a draught. To be administered every three or four hours, until nausea ensues, or the pulse becomes lowered.

This drug possesses narcotic and eliminative properties; and is useful in chronic rheumatism, lumbago, chorea, obscure nervous pains, and in backache from uterine disturbance.

321. American Hellebore.

℞. Tincturæ Veratri Viridis (a saturated solution) min. 5—10; Aquæ, fl. oz. 1. Mix. This draught may be given every three hours, adding one drop of tincture to each dose, until the pulse becomes sufficiently lowered, or nausea is produced. The latter is readily counteracted by small doses of morphia.

It is a valuable arterial sedative; and is particularly used by American physicians in inflammations of the lungs, pleura, or peritoneum, and in acute rheumatism.

322. Lobelia and Ether.

℞. Spiritûs Ammoniæ Aromatici, fl. drs. 2; Tincturæ Lobeliæ Ætheræ, fl. drs. 3—6; Tincturæ Aconiti, min. 30; Aquæ Camphoræ, ad fl. oz. 8. Mix. One-sixth part twice or thrice daily.

As a sedative in some cases of asthma.

323. Stramonium and Henbane.

℞. Extracti Stramonii, gr. 3; Extracti Hyoscyami, gr. 20; Extracti Lupuli, gr. 40. Mix, and divide into twelve pills. One to be taken every four hours, until relief is obtained.

In chronic disorders, attended with suffering, in diseases of the nervous system accompanied with pain and restlessness, and in the dyspnœa of phthisis and emphysema.

℞. Tincturæ Stramonii, fl. drs. 1—2; Tincturæ Hyoscyami, fl. drs. 3—6; Tincturæ Cantharidis, fl. drm. 1; Spiritûs Chloroformi, fl. drs. 3; Aquæ, ad fl. oz. 8. Mix. One-sixth part three times a day.

In some cases of asthma.

324. Opium and Ipecacuanha.

℞. Extracti Opii, Pulveris Ipecacuanhæ, ää gr. 1; Potassæ Nitratis, gr. 8; Glycerini, sufficient to make a mass. Divide into two pills, and order them to be taken at bedtime.

A good narcotic and diaphoretic. It is preferable to the officinal Compound Powder of Ipecacuanha, as the nitrate of potash acts better than the sulphate.

℞. Vini Ipecacuanhæ, fl. drs. 2½; Extracti Opii Liquidi, min. 30; Syrupi Tolutani, fl. drs. 5; Mucilaginis Tragacanthæ, fl. oz. 1. Mix. One teaspoonful every two or three hours.

In chronic cough.

325. Henbane, Camphor, and Hop.

℞. Extracti Hyoscyami, gr. 40—60; Camphoræ, Lupulinæ, ää gr. 20. Mix. Divide into eighteen pills, and order three to be taken every night, at bedtime.

An excellent sedative for hysterical and hypochondriacal patients suffering from sleeplessness. Useful also in some forms of insanity.

℞. Spiritûs Camphoræ, min. 30; Tincturæ Hyoscyami, Tincturæ Lupuli, ää fl. drm. 1; Mucilaginis Acaciæ, fl. oz. 1. Mix for a draught, to be taken at bedtime.

326. Belladonna. Atropia.

℞. Extracti Belladonnæ, gr. 5; Zinci Sulphatis, gr. 30; Extracti Gentianæ, gr. 90. Make a mass, divide into twenty pills, and order one to be taken three times a day.

In cases where a sedative and tonic action is to be produced. Especially useful in some diseases attended with irritability of the urinary organs. Also in many spasmodic coughs. See F. 92.

℞. Extracti Belladonnæ, gr. ¼; Extracti Quassiæ, gr. 2. Mix into a pill to be taken night and morning.

In epilepsy. Requires to be given for a long period.

℞. Camphoræ, gr. 5; Extracti Belladonnæ, gr. ⅓; Extracti Conii, gr. 4; Spiritûs Rectificati, sufficient to make two pills. To be taken every night, at bedtime.

In spermatorrhœa; convulsions; as well as in certain spasmodic affections of the air-passages.

℞. Liquoris Atropiæ, fl. drs. 2. One drop (= gr. 1-120) in a tablespoonful of brandy water, night and morning.

In epilepsy.

The dose to be increased by one drop every second or third week. A preparation of zinc may be given at the same time, if desired.

327. Camphor, Opium, and Blue Pill.

℞. Camphoræ, gr. 5; Extracti Opii, gr. 1; Pilulæ Hydrargyri, gr. 4. Mix, divide into two pills, and order them to be taken at bedtime.

In restlessness, with congestion of the liver, and irritability of the sexual organs. Also, in venereal sores, with nocturnal emissions.

328. Codeia and Assafœtida.

℞. Codeiæ, gr. ½; Pilulæ Assafœtidæ Compositæ, gr. 5. Mix into a pill, to be taken every night, at bedtime.

Especially useful in attacks of spasmodic cough, dyspnœa, &c.

329. Morphia and Assafœtida.

℞. Morphiæ Hydrochloratis, gr. 2; Assafœtidæ, gr. 30; Camphoræ, gr. 20. Make a mass, divide into twelve pills, and order one to be taken at bedtime.

A good stimulant and antispasmodic.

330. Aconite with Guaiacum, Mercury, or Opium.

℞. Tincturæ Aconiti, min. 20—40; Spiritûs Ætheris, fl. drs. 4; Misturæ Guaiaci, ad fl. oz. 8. Mix. One-sixth part every six hours.

As an anodyne, stimulant, and alterative in chronic rheumatism, neuralgia, &c.

℞. Extracti Aconiti, gr. 1—3; Pilulæ Hydrargyri Subchloridi Compositæ, gr. 3. Make into a pill, and order it to be taken every night, at bedtime.

In sleeplessness from a syphilitic taint.

℞. Extracti Aconiti, Extracti Opii, āā gr. 8; Extracti Hyoscyami, gr. 16. Mix, and divide into eight pills. One to be taken every four, six, or eight hours.

In some acute inflammations, as peritonitis, pleurisy, ovaritis, &c.

331. Opium and Sugar of Milk.

℞. Pulveris Ipecacuanhæ Compositi, gr. 1; Sacchari Lactis, gr. 120. Mix, and divide into four powders. One to be taken every night, beaten up in a teaspoonful of cream.

A safe opiate for infants from two to six weeks old.

℞. Tincturæ Opii, min. 1.; Sacchari Lactis, oz. ½; Mucilaginis Tragacanthæ, Aquæ Anethi, āā fl. drs. 4. Mix. One teaspoonful twice or thrice in the twenty-four hours.

To relieve the painful diseases of early life.

332. Tincture of Henbane.

℞. Tincturæ Hyoscyami, fl. oz. 1. One teaspoonful in a wineglassful of water every night at bedtime. The dose may be gradually increased until from one to three fluid ounces can be taken every night.

In some forms of epilepsy.

333. American Wild Cherry.

℞. Tincturæ Pruni Virginianæ, fl. drs. 3—6; Aquæ, ad fl. oz. 8. Mix. One-eighth part every four or six or eight hours. The dose of the Infusion is one ounce, at the same intervals.

As a sedative and tonic in cases of cardiac weakness with inefficient action; in valvular disease with dilatation; mitral regurgitation; chronic bronchitis with valvular disease or dilated ventricles; atonic dyspepsia; intestinal irritability, &c. The action is less powerful than that of digitalis; but it is often better borne, and can be continued for a longer time. After a course of the American Wild Cherry, quinine and steel will often prove useful, though previously they may have been injurious.

334. Preparations of Digitalis.

℞. Infusi Digitalis, fl. drs. 12; Aquæ Anethi, ad fl. oz. 8. Mix. One-sixth part every two, three or four hours.

Recent experiments tend to prove that digitalis is a cardiac stimulant and tonic for a time. In feeble and irregular action of the heart this drug proves of great value; as it also does in dilatation and hypertrophy of the left side of the heart. Digitalis is very serviceable in cardiac dropsy, when there is a feeble and frequent and irregular pulse, with a scanty secretion of high-colored urine; inasmuch as it gives increased force to the heart's contractions, while it has a diuretic action on the kidneys. Digitalis had better be avoided in examples of fatty degeneration of the heart. In some cases of delirium tremens large doses have a very good effect.

℞. Tincturæ Digitalis, fl. drs 1—2; Tincturæ Cardamomi Compositæ. fl. drs. 6; Acidi Hydrocyanici Diluti, min. 20; Aquæ Camphoræ, ad fl. ℥z. 8. Mix. One-sixth part three times a day.

In some forms of cardiac disease with irritability of the stomach.

℞. Acidi Sulphurici Aromatici, fl. drs. 2; Tincturæ Digitalis, fl. drm. 1; Extracti Opii Liquidi min. 30; Infusi Chiratæ, ad fl. oz. 8. Mix. One-sixth part three times a day.

335. Hemlock and Henbane, &c.

℞. Extracti Conii, Extracti Hyoscyami, Pilulæ Rhei Compositæ, ãã gr. 3. Mix, and divide into two pills. To be taken at bedtime.

To relieve sleeplessness with constipation. In some forms of asthma.

℞. Extracti Conii, Extracti Hyoscyami, Pilulæ Hydrargyri, ãã gr. 3; Pulveris Ipecacuanhæ, gr. 1. Mix, and divide into two pills. To be taken at bedtime.

336. Hemlock and Dover's Powder.

℞. Extracti Conii, gr. 36; Pulveris Ipecacuanhæ Compositi, gr. 24. Mix, and divide into twelve pills. One to be taken every three or four hours.

To relieve the pain arising from malignant disease.

337. Henbane and Indian Hemp, &c.

℞. Extracti Cannabis Indicæ, gr. ½—1; Extracti Belladonnæ, gr. ½; Extracti Hyoscyami, gr. 4. Make into a pill. To be taken every twelve or twenty-four hours. The efficacy of this pill can sometimes be increased by giving with it a draught containing some spirit of chloroform or spirit of ether.

338. Iodoform Pills and Suppositories.

℞. Iodoformi, gr. 2—6; Extracti Conii, gr. 4. Mix. Divide into two pills, and order them to be taken at bedtime.

In painful diseases of the stomach. The author has once or twice found a full dose of iodoform relieve a paroxysm of asthma.

℞. Iodoformi, gr. 3—8; Olei Theobromæ, gr. 20. Mix, for a suppository.

As a local anæsthetic in cancerous and other painful diseases of rectum. The anodyne action of iodoform is uncertain.

339. Narcotic Enemata.

℞. Liquoris Morphiæ Acetatis, min. 20—60; Tincturæ Catechu, min. 40; Vini Ipecacuanhæ, min. 30; Mucilaginis Amyli, fl oz. 2. Mix. The bowel should be washed out with warm water before the administration of this enema.

In diarrhœa, tenesmus, strangury, &c.

℞. Extracti Opii Liquidi, min. 20—fl. drm. 1; Tincturæ Belladonnæ, min. 15—30; Mucilaginis Amyli, fl. oz. 2. Mix.

In cancer of uterus, rectum, &c.

340. Opiate Suppositories.

℞. Pulveris Opii, gr. 1—2; Saponis Duri, gr. 10. Mix, for a suppository.

To allay pain or irritation about the pelvic viscera.

℞. Extracti Opii, gr. 1—3; Extracti Belladonnæ, gr. ½; Olei Theobromæ, gr. 20. Mix into a suppository.

Especially useful in diseases of the bladder, uterus, and rectum.

341. Lettuce Opium.

℞. Lactucarii, gr. 8—10. To be divided into two pills. to be taken at bedtime.
A doubtful narcotic. Has been chiefly used as an anodyne in phthisis, or where opium cannot be borne.

342. Indian Hemp, Aconite, and Ether.

℞. Tincturæ Cannabis Indicæ, min. 20; Spiritûs Juniperi, min. 30; Spiritûs Ætheris, min. 45; Tincturæ Aconiti, min. 10; Mucilaginis Acaciæ, ad fl. drs. 12. Mix, for a draught. To be taken at bedtime.
In neuralgic dysmenorrhœa, &c.

343. Opium, or Morphia, and Henbane.

℞. Extracti Opii, gr. 1—4, *vel* Morphiæ Hydrochloratis, gr. ¼—1; Extracti Hyoscyami, gr. 5 Make into two pills, to be taken at bedtime.
For the relief of severe pain, and to afford sleep in lingering diseases.

344. Opium and Belladonna.

℞. Extracti Opii, gr. 1; Extracti Belladonnæ, gr. ½; Extracti Conii, gr. 8. Make into a pill, to be taken every three or four hours.
In intestinal obstruction. And in other cases where it is necessary to relieve severe pain without inducing constipation. The belladonna also increases considerably the hypnotic action of the opium.

345. Opium and Capsicum.

℞. Extracti Opii, gr. 1—2; Capsici Fructûs, gr. 2; Extracti Hyoscyami, gr. 4. Make into two pills, to be taken every night at bedtime.
In those diseases where opium is needed, but where it is not well borne, owing to its producing headache, sickness, &c. The stimulating effect of the capsicum will often ward off these unpleasant results.

346. Morphia and Squill Linctus.

℞. Syrupi Scillæ, Syrupi Rhœados, ȧā fl. drs. 10; Aquæ Laurocerasi, min. 15; Tincturæ Benzoini Compositæ, fl. drs. 3; Liquoris Morphiæ Hydrochloratis, fl. drm. 1. Mix and label,—"A small teaspoonful to be taken frequently, if the cough is troublesome."

347. Compound Linctus.

℞. Spiritûs Chloroformi, fl. drs. 4; Vini Ipecacuanhæ, fl. drs. 2; Liquoris Morphiæ Hydrochloratis, fl. drm. 1; Acidi Hydrocyanici Diluti, min. 15; Syrupi Mori, ad fl oz. 3. Mix, and label,—"One teaspoonful every two or three hours, until the cough is relieved." See F. 246, 247.

XV. REFRIGERANTS AND SALINES.

348. Saline Draughts.

℞. Sodæ Bicarbonatis, gr. 20; Aquæ Laurocerasi, min. 10; Syrupi Limonis, fl. drm. 1; Aquæ, ad fl. oz. 2. Mix. An effervescing draught is to be made by the addition of a tablespoonful of lemon-juice, or of eighteen grains of citric acid. To be taken every four or six hours.
In fever with nausea.

℞. Spiritûs Ætheris Nitrosi, fl. drs. 4; Liquoris Ammoniæ Acetatis, fl. drs. 12—18; Vini Colchici, fl. drm. 1; Aquæ Camphoræ, ad fl. oz. 8. Mix. Two tablespoonfuls every four hours.

℞. Syrupi Scillæ, fl. drs. 6; Spiritûs Ætheris Nitrosi, Tincturæ Hyoscyami, ȧȧ fl. drs 3; Infusi Rosæ Acidi, ad fl. oz. 8. Mix. One-sixth part every six hours.
In influenza, catarrh, &c.

℞. Potassæ Nitratis, gr. 40, *vel* Potassæ Citratis, gr. 100; Vini Antimoniale, fl. drm. 1; Liquoris Ammoniæ Acetatis, fl. drs. 14; Aquæ Camphoræ, ad fl. oz. 8. Mix. One-sixth part every four hours.

349. Saline with Excess of Ammonia.

℞. Liquoris Ammoniæ Acetatis, fl. drs. 10; Spiritûs Ammoniæ Aromatici, fl. drs. 3; Syrupi Limonis, fl. drs. 6; Tincturæ Aconiti, min. 30; Aquæ, ad fl. oz. 8. Mix. One-sixth part every four hours.

In the early stages of fever, tonsillitis, acute pneumonia, &c.

350. Dr. Stevens's Saline Mixture.

℞. Sodii Chloridi, gr. 20; Potassæ Chloratis, gr. 7; Sodæ Carbonatis, gr. 30; Aquæ, fl. drs. 12. Mix. To be taken every half hour.

In malignant cholera.

351. Colchicum and Magnesia.

℞. Vini Colchici, fl. drs. 1½; Magnesiæ Carbonatis, gr. 120; Spiritûs Ammoniæ Aromatici, fl. drs. 3; Tincturæ Hyoscyami, fl. drs. 4—6; Aquæ Camphoræ, ad fl. oz. 8. Mix. One-sixth part night and morning.

In slight cases of gout, &c.

352. Colchicum and Chlorate of Potash.

℞. Vini Colchici, fl. drs. 2; Potassæ Chloratis, gr. 120; Liquoris Ammoniæ Citratis, fl. drs. 20; Aquæ Camphoræ, ad fl. oz. 8. Mix. One-sixth part three times a day.

In gout with heat and dryness of the skin.

353. Borax and Nitric Ether.

℞. Boracis, gr. 80; Spiritûs Ætheris Nitrosi, fl. drs. 3; Syrupi Papaveris, fl. drs. 6; Infusi Lini, ad fl. oz. 8. Mix. One-sixth part every six hours.

354. Ammonia, Chlorinated Soda, and Serpentary.

℞. Ammoniæ Carbonatis, gr. 30; Liquoris Sodæ Chloratæ, fl. drm. 1; Infusi Serpentariæ, fl. oz. 8. Mix. One-sixth part every six hours.

As a diaphoretic and stimulant in the low stage of continued fever. See F. 368.

355. Bicarbonate of Potash Drink.

℞. Potassæ Bicarbonatis, oz. ½—¾; Syrupi Limonis, fl. oz. 1; Aquæ ad O. 2. Mix, for the day's drink.

Very useful in the uric acid diathesis, in acute rheumatism, &c. A drink called "Constitution water" owes its efficacy to the bicarbonate of potash it contains.

356. Cream of Tartar Drink.

℞. Potassæ Tartratis Acidæ, oz. 1; Olei Limonis, min. 15; Sacchari Albi, oz. 2; Aquæ Bullientis, O. 2. Mix. To be used when cold, as a common drink.

In simple fever, with constipation and great thirst.

357. Hydrochloric Acid Drinks.

℞. Acidi Hydrochlorici Diluti, fl. drs. 2—3; Mellis Depurati, oz. 1; Decocti Hordei, O. 2. Mix, for the daily drink.

In typhus, &c.

℞. Acidi Hydrochlorici Diluti, fl. drs. 2; Potassæ Chloratis, gr. 180; Syrupi Zingiberis, fl. oz. 1; Decocti Hordei, O. 2. Mix.

A valuable drink in some cases of fever.

358. Saline Lemonade.

℞. Sodii Chloridi, gr. 200; Potassæ Chloratis, gr. 240; Sodæ Tartaratæ, gr. 100; Sodæ Phosphatis, gr. 50; Succi Limonis recentis, fl. oz. 6; Syrupi Limonis, fl. oz. 14; Aquæ, O. 7. Mix.

To be taken ad libitum, iced or not as is most agreeable, in cholera and choleraic diarrhœa.

359. Phosphoric Acid Drink.

℞. Acidi Phosphorici Diluti, fl. drs. 3; Glycerini, fl. oz. 1; Decocti Hordei, O. 2. Mix.

An efficacious drink for assuaging thirst in some diseases attended with nervous exhaustion. It was recommended by Dr. Paris and Sir Thomas Watson as useful in diabetes; but according to Griesinger it positively increases the quantity of sugar excreted.

360. Chlorate of Potash Drinks.

℞. Potassæ Chloratis, gr. 60; Syrupi Hemidesmi, fl. oz. 1; Aquæ, O. 1. Mix.

In the eruptive fevers, some inflammations, &c.

℞. Potassæ Chloratis, oz. 1; Potassæ Bicarbonatis, oz. 2—4. Mix, and divide into eight powders. One to be dissolved in a pint of barley-water for the day's drink.

In acute rheumatism.

XVI. STIMULANTS.

361. Ammonia and Bitters.

℞. Ammoniæ Carbonatis, gr. 30; Spiritûs Myristicæ, fl. drs. 2; Tincturæ Chloroformi Compositæ, fl. drm 1; Tincturæ Cardamomi Compositæ, fl. drs. 6; Infusi Caryophylli, ad fl. oz. 8. Mix. One-sixth part every four or six hours.

In debility with nausea and flatulence. Also in erysipelas, tonsillitis, scarlet fever, &c.

℞. Spiritûs Ammoniæ Aromatici, fl. drs. 3; Tincturæ Lupuli, fl. drs 6; Spiritûs Ætheris, fl. drs. 3; Tincturæ Gentianæ Compositæ, fl. oz. 1; Infusi Sennæ, ad fl. oz. 8. Mix. One-sixth part twice or thrice daily.

In phosphuria with constipation.

℞. Spiritûs Ammoniæ Aromatici, fl. drs. 3; Aquæ Laurocerasi, fl. drm. 1; Sodæ Bicarbonatis, gr. 60; Tincturæ Calumbæ, fl. drs. 6; Aquæ Anethi, ad fl. oz. 8. Mix. One-sixth part two or three times a day.

To relieve nausea, or vomiting, with heartburn.

℞. Tincturæ Valerianæ Ammoniatæ, fl. drs. 3; Tincturæ Rhei, fl. drs. 6; Tincturæ Lavandulæ Compositæ, fl. oz. 1; Aquæ Pimentæ, fl. oz. 8. Mix. One-sixth part when oppressed with languor or faintness.

In hypochondriasis and hysteria.

362. Ammonia in Effervescence.

℞. Ammoniæ Carbonatis, gr. 120; Acidi Hydrocyanici Diluti, min. 20; Tincturæ Cardamomi Compositæ, fl. drs. 6; Infusi Aurantii, ad fl. oz. 8. Mix. One-sixth part to be made into an effervescing draught with one tablespoonful of fresh lemon-juice, or with eighteen grains of citric acid. To be taken twice or thrice daily.

In irritability of the stomach, with depression.

℞. Spiritûs Ammoniæ Aromatici, fl. drs. 4; Potassæ Bicarbonatis, gr. 120; Spiritûs Chloroformi, fl. drs. 6; Tincturæ Hyoscyami, fl. drs. 3; Infusi Cascarillæ, ad fl. oz. 8. Mix. One-sixth part every four hours, made into an effervescing draught with one tablespoonful of lemon-juice.

In irritable stomach with undue acidity of the secretions.

363. Formiate of Ammonia.

℞. Ammoniæ Formiatis, gr. 30; Aquæ, fl. oz. 8. Mix. One-sixth part three times a day.

Recommended by Dr. Ramskill in chronic paralytic disease, accompanied by general torpor. Also in reflex paralysis and in some forms of epilepsy. It is contraindicated where there is active disease in the nervous centres, and in cases where the stomach is irritable.

364. Phosphate of Ammonia and Ether.

℞. Ammoniæ Phosphatis, gr. 60—100; Spiritûs Ætheris, fl. drs. 3; Infusi Caryophylli, ad fl. oz. 8. Mix. One-sixth part three times a day.

In debility with a tendency to gout or rheumatism. Also in hypochondriasis.

365. Hydrochloric Acid and Ether.

℞. Acidi Hydrochlorici Diluti, fl. drm. 1; Spiritûs Ætheris, fl. drs. 3; Syrupi Aurantii, fl. drs. 6; Infusi Aurantii, ad fl. oz. 8. Mix. One-sixth part every six hours.

In continued fever, and in cases where the respired air is ammoniacal.

366. Cajuput Oil and Cloves.

℞. Olei Cajuputi, min. 5; Pulveris Tragacanthæ Compositi, gr. 60; Aquæ Destillatæ, fl. drs. 2. Beat thoroughly together, and add—Infusi Caryophylli, fl. drs. 10. Mix. To be taken occasionally.

In hysteria, flatulent colic, and many spasmodic diseases.

℞. Olei Cajuputi, min. 4; Sacchari Lactis, gr. 120. Beat up thoroughly, and add—Decocti Aloes Compositi, fl. oz. 1½. Mix. To be taken occasionally, early in the morning.

As a stimulant and laxative, where there is a tendency to flatulence and a loaded rectum.

367. Ether and Brandy.

℞. Spiritûs Ætheris, fl. drs. 3; Spiritûs Vini Gallici, fl. drs. 12; Infusi Cinchonæ Flavæ, ad fl. oz. 8. Mix. One-sixth part every four or six hours.

At the commencement of convalescence from many acute diseases.

℞. Spiritûs Chloroformi, fl. drs. 6; Misturæ Spiritus Vini Gallici (F. 17), fl. oz. 8. Mix. One-sixth part every six hours.

In the stages of low fever with restlessness.

368. Solution of Chlorinated Soda.

℞. Liquoris Sodæ Chloratæ, fl. drs. 1—2; Syrupi Tolutani, fl. oz. 1; Tincturæ Serpentariæ, fl. drs. 6; Aquæ, ad fl. oz. 8. Mix. One-sixth part every six hours.

In low fever this mixture will clean the tongue, promote the action of the skin and kidneys, correct the offensive state of the evacuations, and rouse the patient. See F. 354.

℞. Liquoris Sodæ Chloratæ, fl. drm. 1; Tincturæ Cinchonæ Compositæ, fl. drs. 6; Spiritus Vini Gallici, fl. drs. 12; Tincturæ Cantharidis, min. 40; Aquæ, ad fl. oz. 8. Mix. One-sixth part every three or four hours.

In low fever, with great prostration.

369. Sumbul, Quinine, Hop, &c.

℞. Tincturæ Sumbulis, fl. drs. 1—8; Infusi Lupuli, ad fl. oz. 8. Mix. One-sixth part three times a day.

In some cases of hysteria, epilepsy, threatened delirium tremens, &c., where a stimulant and antispasmodic is needed. See F. 95.

℞. Tincturæ Quiniæ, Tincturæ Rhei, Tincturæ Lupuli, āā fl. drs. 4. Mix. One teaspoonful in a wineglassful of water twice a day.

In dyspepsia from weakness of the digestive organs, and constipation. See F. 385.

370. Preparations of Oxygen.

BARTH'S PATENT OXYGEN-WATER is sold in bottles which contain nearly half an imperial pint of distilled water, with about 13.5 cubic inches, or 4.6 grains, of gaseous oxygen. The contents of two, three, or four bottles may be taken daily.

The effect is to promote digestion, to render the secretions and excretions healthy, to improve the condition of the blood, and possibly to control nervous force.

PEROXIDE OF HYDROGEN may be regarded as water supersaturated with oxygen. A solution charged with ten volumes of oxygen is usually employed, the dose varying from fluid drachms 1—4, in two ounces of water two or three times a day.

Useful in many diseases attended with dyspnœa,—as chronic bronchitis, pulmonary condensation, valvular cardiac disease with congestion of the lungs, some forms of asthma, laryngitis, hooping-cough, &c. Also in dyspepsia, congestion of the liver, possibly in diphtheria and croup, as well as in strumous and other ulcerations. It appears likewise to favor the action of steel and cod-liver oil, which remedies, however, should not be given at the same hour that the peroxide is administered.

OXYGEN GAS can be best inhaled by using a large vulcanite bag filled with oxygen and air—1 to 4. This mixture is to be inhaled for half an hour once or twice a day, slowly inspiring it at short intervals and filling the lungs as much as possible.

Messrs. Robbins & Co. have prepared a powder which they call the "Patent Oxygenator." On placing a wineglassful of this material in the vase of Dr. Beigel's Universal Inhaler, and pouring over it half a pint of boiling water, pure oxygen will be evolved. Inhalation may be practiced once or twice a day, for ten or fifteen minutes at a time.

XVII. TONICS.

371. Bark and Ammonia.

℞. Ammoniæ Carbonatis, gr. 30; Tincturæ Lavandulæ Compositæ, fl. oz. 1; Infusi Cinchonæ Flavæ, ad fl. oz. 8. Mix. One-sixth part every six hours.

℞. Ammoniæ Phosphatis, gr. 60; Tincturæ Aconiti, min. 40; Tincturæ Cinchonæ Compositæ, fl drs. 6; Aquæ Menthæ Piperitæ, ad fl. oz. 8. Mix. One-sixth part three times a day.

℞. Ammoniæ Carbonatis, gr. 30; Extracti Opii Liquidi, min. 30; Spiritûs Ætheris, fl. drs. 3; Decocti Cinchonæ Flavæ, ad fl. oz. 8. Mix. One-sixth part every three or four hours.

In cases where it is feared that a deposition of fibrin has taken place in the heart or one of the large vessels.

℞. Spiritûs Ammoniæ Aromatici, Spiritûs Chloroformi, āā fl. drs. 7; Liquoris Morphiæ Hydrochloratis, fl. drs. 2; Extracti Cinchonæ Flavæ Liquidi, fl. drs. 4; Tincturæ Cinchonæ Flavæ, ad fl. oz. 3. Mix. Direct,—"One teaspoonful in a wineglassful of port wine three times a day."

In certain cases of phthisis this mixture is very useful, especially in conjunction with cod-liver oil and a liberal diet.

372. Ammonia, Bark, and Rhubarb.

℞. Spiritûs Ammoniæ Aromatici, fl. drs. 4; Extracti Cinchonæ Flavæ Liquidi, fl. drs. 1½; Tincturæ Rhei, fl. drs. 4; Infusi Rhei, ad fl. oz. 8. Mix. One-sixth part twice or thrice daily.

In nervous depression, &c., with constipation.

373. Bark and Liquor Potassæ.

℞ Liquoris Potassæ, fl. drs. 3; Tincturæ Cinchonæ Compositæ, fl. drs. 6; Decocti Cinchonæ Flavæ, ad fl. oz. 8. Mix. One-sixth part twice or thrice daily.

In debility attended with the lithic acid diathesis.

374. Bark and Serpentary.

℞. Tincturæ Cinchonæ Compositæ, fl. oz. 1; Tincturæ Aconiti, min. 30; Tincturæ Serpentariæ *vel* Tincturæ Actææ Racemosæ, fl. drs. 3; Aquæ Menthæ Piperitæ, ad fl. oz. 8. Mix. One-sixth part three times a day.

In some cases of chronic rheumatism, lumbago, and rheumatoid arthritis.

375. Bark and Hemlock.

℞. Tincturæ Cinchonæ Compositæ, fl. drs. 6; Succi Conii, fl. drs. 4; Aquæ Pimentæ, ad fl. oz. 8. Mix. One-sixth part three times a day.

In chronic diseases attended with debility and pain.

376. Acid Mixtures and Bark.

℞. Acidi Sulphurici Aromatici, fl. drs. 2; Syrupi Aurantii, fl. oz. 1; Tincturæ Cinchonæ Compositæ, fl. drs. 6; Infusi Cinchonæ Flavæ, ad fl. oz. 8. Mix. One-sixth part twice or thrice daily, on an empty stomach.

Especially useful in depressing disorders accompanied with occasional attacks of hemorrhage.

℞. Acidi Phosphorici Diluti, fl. drs. 1½; Syrupi Aurantii, fl. drs. 6; Tincturæ Cinchonæ Compositæ, fl. oz. 1; Infusi Aurantii, ad fl. oz. 8. Mix. One-sixth part three times a day.

In debility, with nervous irritability.

℞. Acidi Nitrici Diluti, *vel* Acidi Phosphorici Diluti, fl. drs. 1½; Tincturæ Nucis Vomicæ, fl. drm. 1; Extracti Cinchonæ Flavæ Liquidi, fl. drs. 2; Aquæ Menthæ Piperitæ, ad fl. oz. 8. Mix. One-sixth part three times a day, two hours before each meal.

In general weakness, with nervous exhaustion.

℞. Acidi Acetici Glaciale, min. 20—35; Tincturæ Belladonnæ, Extracti Cinchonæ Flavæ Liquidi, āā fl. drs. 4; Tincturæ Cardamomi Compositæ, fl. oz. 2. Mix and label,—"One small teaspoonful in a wineglassful of water twice or three times a day."

After operations on cancerous growths, to prevent recurrence.

377. Acid Mixtures with Calumba, &c.

℞. Tincturæ Calumbæ, fl. drs. 6; Acidi Sulphurici Aromatici, fl. drs. 1½; Syrupi Aurantii, fl. oz. 1; Infusi Aurantii, ad fl. oz. 8. Mix. One-sixth part three times a day when the stomach is empty.

℞. Acidi Hydrochlorici Diluti, fl. drs. 1½; Acidi Hydrocyanici Diluti, min. 20; Infusi Chiratæ, ad fl. oz. 8. Mix. One-sixth part three times a day, immediately before the meals.

As a stomachic, especially in the dyspepsia of gouty subjects.

℞. Succi Limonis recentis, fl. drs. 12; Syrupi Limonis, fl. oz. 1; Infusi Chiratæ, ad fl. oz. 8. Mix. One-sixth part three times a day.

Where there is debility with a threatening of rheumatic fever. In cancer of the stomach, &c.

378. Nitro-Hydrochloric Acid Mixtures.

℞. Acidi Nitro-Hydrochlorici Diluti, fl. drs. 1½—3; Tincturæ Chiratæ, fl. drs. 3; Tincturæ Aconiti, min. 30; Syrupi Aurantii, fl. oz. 1; Infusi Aurantii, ad fl. oz. 8. Mix. One-sixth part three times a day, an hour before each meal.

In oxaluria, dyspepsia, rheumatoid arthritis, &c.

℞. Acidi Nitro-Hydrochlorici Diluti, fl. drs. 2; Acidi Hydrocyanici Diluti, min. 25; Succi Taraxaci, fl. drs. 6; Tincturæ Gentianæ Compositæ, fl. oz. 1; Infusi Sennæ, ad fl. oz. 8. Mix. One-sixth part twice or thrice daily.

In dyspepsia, with sluggish action of the liver. The efficacy of this mixture may often be increased by giving with each dose a pill containing one or two grains of sulphate of zinc and four of extract of gentian.

℞. Acidi Nitro-Hydrochlorici Diluti, fl. drs. 2; Liquoris Strychniæ, min. 30—fl. drm. 1; Spiritûs Chloroformi, fl. drs. 6; Tincturæ Zingiberis, fl. drs. 3; Aquæ, ad fl. oz. 8. Mix. One-eighth part, with a large tablespoonful of water, three times a day.

In any form of functional paralysis after all the appreciable causes are remedied. Also in obstinate debility, hypochondriasis, atonic dyspepsia, diabetes insipidus, alkaline urine, &c.

℞. Acidi Nitro-Hydrochlorici Diluti, fl. drs. 1½; Tincturæ Belladonnæ, fl. drm. 1; Extracti Pareiræ Liquidi, fl. drm. 1; Decocti Pareiræ, ad fl. oz. 8. Mix. One-sixth part, with one of the following pills, every six hours:

℞. Acidi Benzoici, gr. 30; Glycerini, sufficient to make a mass. Divide into six pills, and silver them.

In incontinence of urine, when the reaction of the latter is alkaline. Also in some forms of hepatic congestion.

379. Quinine Mixtures and Pills.

℞. Quiniæ Sulphatis, gr. 12; Acidi Nitrici Diluti, *vel* Acidi Phosphorici Diluti, *vel* Acidi Hydrochlorici Diluti, *vel* Acidi Sulphurici Aromatici, fl. drs. 1½; Tincturæ Lupuli, fl. drs. 6; Aquæ, ad fl. oz. 8. Mix. One-sixth part three times a day.

Amongst other purposes, this mixture may be used to check the night-sweats in phthisis.

℞. Tincturæ Quiniæ, fl. drs. 14; Tincturæ Zingiberis Fortioris, fl. drs. 2; Glycerini, fl. oz. 1. Mix. One teaspoonful, in a wineglassful of water, three times a day.

In neuralgia, nervous irritability, weakness, &c.

℞. Quiniæ Sulphatis, gr. 18; Extracti Lupuli, gr. 40. Make a mass, divide into twelve pills, and order one to be taken three times a day.

℞. Quiniæ Sulphatis, gr. 4; Acidi Phosphorici Diluti, min. 20; Syrupi Aurantii, fl. drs 4; Aquæ, ad fl. oz. 4. Mix. One small tablespoonful three times a day.

In strumous ophthalmia and other cases of debility in children.

℞. Quiniæ Sulphatis, gr. 64; Acidi Sulphurici Diluti, min. 10; Aquæ, fl. drs. 4. Mix. From fifteen minims to half a drachm (gr. 4—8) may be carefully injected into the subcutaneous connective tissue. Only a clear solution is to be used. Absorption of quinine merely suspended in fluid is, at least, uncertain; the alkaloid must be in solution. The injection may have to be repeated three, four, or more times before a cure is effected.

In intermittent fever, &c.

380. Quinine and Steel.

℞. Quiniæ Sulphatis, Ferri Sulphatis, āā gr. 12; Liquoris Strychniæ, min. 30; Acidi Sulphurici Aromatici, fl. drs. 1½; Infusi Quassiæ, ad fl. oz. 8. Mix. One-sixth part three times a day.

The black stools, which are passed while any preparation of steel is being taken, are due to the combination of the metal with part of the sulphur of the food,—forming sulphuret of iron.

℞. Quiniæ Sulphatis, gr. 9; Acidi Hydrochlorici Diluti, fl. drm. 1; Tincturæ Arnicæ, min. 30—fl. drm. 1; Tincturæ Ferri Perchloridi, fl. drs. 1½; Infusi Caryophylli, ad fl. oz. 8. Mix. One-sixth part three times a day.

In general debility, diphtheria, erysipelas, &c.

℞. Quiniæ Sulphatis, gr. 12; Tincturæ Ferri Perchloridi, fl. drs. 2; Tincturæ Nucis Vomicæ, fl. drm. 1; Tincturæ Lupuli, fl. drs 6; Magnesiæ Sulphatis, oz. 1; Infusi Lupuli, ad fl. oz. 8. Mix. One-sixth part daily, three hours after breakfast.

In habitual constipation with debility.

℞. Quiniæ Sulphatis, Ferri Sulphatis Exsiccatæ, āā gr. 20; Extracti Hyoscyami, gr. 30. Make a mass, divide into twelve pills, and order one to be taken twice a day.

In debility with irritability of the nervous system.

℞. Quiniæ Sulphatis, gr. 12; Ferri Redacti, gr. 30; Extracti Aconiti, gr. 12; Glycerini, sufficient to form a mass. Divide into twelve pills, and order one to be taken an hour after dinner and supper.

In neuralgia, rheumatoid arthritis, painful chronic affections with debility, &c.

℞. Ferri et Quiniæ Citratis, gr. 30; Tincturæ Chiratæ, fl. drs. 1 ½; Aquæ, ad fl. oz. 8. Mix. One-sixth part three times á day.

An excellent tonic where there is exhaustion, with a weak and irritable stomach. If the strong bitter is objectionable, Tincture of Lemon-peel may be substituted for the Chiretta.

381. Quinine, Steel, and Arsenic.

℞. Tincturæ Quiniæ, fl. oz. 1; Liquoris Arsenicalis, min. 18; Ferri et Ammoniæ Citratis, gr. 30; Aquæ Aurantii, ad fl. oz. 8. Mix. One-sixth part two or three times a day, after meals.

In diseases of the skin, &c., with impoverished blood.

℞. Quiniæ Sulphatis, gr. 9; Acidi Phosphorici Diluti, Tincturæ Ferri Perchloridi, āā fl. drs. 1½; Liquoris Arsenici Hydrochlorici, min. 15—40; Syrupi Zingiberis, fl. drs. 6; Aquæ Cinnamomi, *vel* Infusi Quassiæ, ad fl. oz. 8. Mix. One-sixth part directly after breakfast, dinner, and supper.

In many skin diseases, rheumatoid arthritis, carbuncular inflammation, &c. See F. 52, 399.

382. Quinine and Iodide of Iron.

℞. Tincturæ Quiniæ, fl. oz. 1; Syrupi Ferri Iodidi, fl. drs. 3—6; Infusi Calumbæ, ad fl. oz. 8. Mix. One-sixth part three times a day.

In debility with a strumous taint, chronic rheumatism, tertiary syphilis, goitre, &c.

383. Quinine and Belladonna.

℞. Quiniæ Sulphatis, gr. 24; Extracti Belladonnæ, gr. 4; Camphoræ, gr. 30; Confectionis Rosæ Gallicæ, sufficient to make a mass. Divide into twelve pills, silver them, and order one to be taken twice or thrice daily, in conjunction with one teaspoonful of good vinegar mixed with a wineglassful of sugared water.

In some painful diseases (neuralgia, cancer, dysmenorrhœa, &c.), where a sedative and tonic are needed. See F. 44.

384. Quinine and Ipecacuanha.

℞. Quiniæ Sulphatis, gr. 12; Pulveris Ipecacuanhæ, gr. 12—24; Extracti Gentianæ, gr. 24. Mix. Divide into twelve pills, and order one to be taken every day at dinner.

An excellent remedy in cases of slow digestion. See F. 44.

385. Quinine and Rhubarb.

℞. Quiniæ Sulphatis, gr. 24; Pulveris Rhei, gr. 36; Extracti Lupuli, gr. 40. Mix. Divide into twenty-four pills, and order two to be taken night and morning.

386. Quinine and Ammonia.

℞. Tincturæ Quiniæ, fl. oz. 1; Glycerini, fl. drs. 6; Spiritûs Ammoniæ Aromatici, Spiritûs Ætheris, āā fl. drs. 3; Extracti Opii Liquidi, min 30; Infusi Aurantii, *vel* Infusi Cinchonæ Flavæ, ad fl. oz. 8. Mix. One-sixth part every six hours.

In great exhaustion, with low muttering delirium and restlessness.

387. Quinine and Nux Vomica.

℞. Quiniæ Sulphatis, gr. 18; Extracti Nucis Vomicæ, gr. 3—6; Extracti Gentianæ, gr. 35. Mix, and divide into twelve pills. One to be taken night and morning.

In debility with constipation. See F. 175, 409.

388. Substitutes for Quinine.

℞. Beberiæ Sulphatis, gr. 30; Acidi Sulphurici Aromatici, min. 40; Syrupi Aurantii, fl. oz. 1; Aquæ Aurantii Floris, ad fl. oz. 8. Mix. One-sixth part three times a day.

In neuralgic affections assuming a periodic character; as well as in intermittent and remittent fevers. Beberia does not produce cerebral disturbance and headache like quinine. This sulphate of an alkaloid is said to be an ingredient of Warburg's Fever-drops.

℞. Salicini, gr. 60; Extracti Sarsæ Liquidi, fl. drs. 6; Infusi Gentiana Compositi, ad fl. oz. 8. Mix. One-sixth part three times a day.

During convalescence from acute disorders of the digestive organs. The antiperiodic properties of salicin render it useful in intermittent and some other fevers.

℞. Salicini, gr. 120; Glycerini, fl. oz. 1; Tincturæ Aurantii, ad fl. oz. 3. Mix. One teaspoonful in a wineglassful of water night and morning.

Where the stomach is easily nauseated and cannot digest quinine, this formula will be useful.

389. Cod-Liver Oil.

The oil most commonly used is of a pale straw color, the dose varying from a teaspoonful to a large tablespoonful twice or thrice daily. It should be taken immediately after meals; floating it on milk, coffee, beef tea, orange-juice, orange wine, brandy and water, cherry brandy, &c. Chewing a piece of lemon-peel or cinnamon, or a few cloves previously, will disguise the flavor. Sometimes it is preferred made into an emulsion; which may be done by beating it up with an equal proportion of lime-water, or of milk, or with the yolk of an egg and some compound tincture of cardamoms. When the oil proves indigestible, giving rise to nausea or unpleasant eructations, the stomach can often be made to tolerate it by administering some preparation of pepsin (F. 420) with each dose. Dr. De Jongh's oil is pure, and is prescribed by many practitioners.

Cod-liver oil may be impregnated with various drugs,—such as any of the essential oils, morphia, arsenic, iodine, mercury, quinine, zinc, iron, &c. Too large a quantity of the solution must not be made at a time, as the oil soon becomes rancid. Combined with ozone [an allotropic modification of oxygen,—ἄλλος = another + τρόπος = manner of existence], it has been found to lessen considerably the frequency of the pulse in phthisis. The dose of ozonized oil, according to Dr. E. Symes Thompson, is from two to four drachms, two or three times a day. See F. 22, 32, 283, 390, and 418.

390. Iodide of Iron and Cod-Liver Oil.

℞. Syrupi Ferri Iodidi, fl. drs. 4; Mucilaginis Tragacanthæ, fl. oz. 1; Olei Morrhuæ, fl. oz. 4½. Mix. One tablespoonful twice or thrice daily.

In some forms of scrofula, phthisis, mild constitutional syphilis, &c.

℞. Potassii Iodidi, g. 3—5; Glycerini, fl. drs. 2; Vini Ferri, fl. drs. 4; Olei Morrhuæ, fl. drs. 6. Mix, and make a draught, to be taken twice a day.

In chronic rheumatism, tertiary syphilis, strumous skin diseases, &c.

391. Steel and Cocoanut Oil.

℞. Olei Cocos Nucis, fl. drs. 2; Spiritûs Ammoniæ Aromatici, min. 30; Ferri et Ammoniæ Citratis, gr. 5; Aquæ Menthæ Piperitæ, ad fl. oz. 1. Mix, and make a draught, to be taken twice or thrice daily.

Deserving of trial when cod-liver oil causes nausea.

392. Steel and Glycerin.

℞. Tincturæ Ferri Perchloridi, fl. drs. 1½—2; Zinci Phosphatis, gr. 6; Spiritûs Chloroformi, fl. drs. 3; Glycerini, fl. oz. 1; Aquæ, ad fl. oz. 8. Mix. One-sixth part three times a day.

In some cases it is better to omit the glycerin from this mixture; administering cod-liver oil instead, after one or two of the chief meals of the day.

℞. Tincturæ Ferri Perchloridi, fl. drs. 2—4; Glycerini, fl. drs. 4; Tincturæ Cardamomi Compositæ, fl. oz. 1; Aquæ, ad fl. oz. 8. Mix. One-eighth part every three or four hours.
In diphtheria, erysipelas with albuminuria, &c.

℞. Spiritûs Ammoniæ Aromatici, fl. drs. 4; Ferri et Ammoniæ Citratis, gr. 40: Infusi Quassiæ, fl. oz. 6½; Glycerini, fl. oz. 1. Mix. One-sixth part three times a day.
In general debility, with a torpid state of the colon.

393. Steel and Digitalis.

℞. Tincturæ Ferri Perchloridi, min. 80; Infusi Digitalis, fl. oz. 2; Aquæ Camphoræ, ad fl. oz. 8. Mix and label,—"One-eighth part, with one tablespoonful of water, three times a day."
In some forms of cardiac and renal dropsy, &c.

394. Steel and Pepsin.

℞. Ferri Redacti, gr. 12—60; Pepsinæ Porci, gr. 36; Zinci Phosphatis, gr. 18; Glycerini, sufficient to make a mass. Divide into twenty-four pills, silver them, and order two to be taken every day at dinner.
In anæmia, &c., with weakness of the digestive organs.

℞. Ferri et Ammoniæ Citratis, gr. 20; Spiritûs Vini Gallici, fl. oz. 1; Vini Pepsinæ, fl. drs. 4; Aquæ, ad fl. oz. 6. Mix. One-half to be taken every day at dinner. See F. 420.

395. Steel and Hemlock.

℞. Pilulæ Ferri Carbonatis, gr. 60; Extracti Conii, gr. 36—60. Mix, and divide into twenty-four pills. Two to be taken twice or thrice daily.
In incipient phthisis, and in many diseases attended with cough and debility.

396. Steel Electuaries.

℞. Ferri Peroxidi Hydrati, Mellis Depurati, ãã oz. 2. Mix. One teaspoonful twice a day.
In chorea, &c.

℞. Ferri Carbonatis Saccharatæ, gr. 120—240; Oxymellis, fl. oz. 3. Mix. One teaspoonful twice or thrice daily after meals. Where there is no objection to pills it will be better to prescribe from 5—10 grs. of the officinal PILULA FERRI CARBONATIS twice a day.

397. Steel and Hydrochloric Acid.

℞. Tincturæ Ferri Perchloridi, fl. drs. 1½; Acidi Hydrochlorici Diluti, fl. drs. 2; Spiritûs Chloroformi, fl. drs. 3; Infusi Quassiæ, ad fl. oz. 8. Mix. One-sixth part three times a day. See F. 101.

398. Steel and Gentian.

℞. Ferri Sulphatis Granulatæ, Extracti Gentianæ, ãã gr. 30. Mix, divide into twelve pills, and order one to be taken three times a day.
In chlorosis, &c.

399. Steel and Arsenic.

℞. Vini Ferri, fl. oz. 4; Liquoris Arsenicalis, min. 20; Syrupi Zingiberis, fl. oz. 2. Mix. One-sixth part, with three tablespoonfuls of water, three times a day, immediately after meals.
For cases of purpura. In reduced doses as a tonic and alterative in some of the skin diseases of children. See F. 52, 381, 402.

℞. Syrupi Ferri Phosphatis, fl. oz. 2; Liquoris Sodæ Arseniatis, min. 80. Mix. One teaspoonful in a wineglassful of water directly after dinner and supper.
In some forms of spleen disease, &c.

400. Steel and Cantharides.

℞. Tincturæ Cantharidis, fl. drs. 1½; Glycerini, fl. oz. 1; Misturæ Ferri Compositæ, ad fl. oz. 8. Mix. One-sixth part three times a day.
In debility of the generative organs, some forms of incontinence of urine, &c.

℞. Tincturæ Cantharidis, Tincturæ Ferri Perchloridi, ää fl. drm. 1; Tincturæ Capsici, fl. drs. 1½; Syrupi Hemidesmi, fl. oz. 1; Aquæ, ad fl. oz. 8. Mix. One-sixth part three times a day.

401. Steel and Ammonia.

℞. Ferri Tartarati, gr. 60; Spiritûs Ammoniæ Aromatici, fl. drs. 3; Infusi Quassiæ, ad fl. oz. 8. Mix. One-sixth part three times a day.
In chlorosis, leucorrhœa from relaxation of vaginal mucous membrane, &c.

℞. Ferri et Ammoniæ Citratis, gr. 40; Ammoniæ Carbonatis, gr. 30; Tincturæ Zingiberis, fl. drs. 3; Aquæ, ad fl. oz. 8. Mix. One-sixth part three times a day.

402. Steel and Chlorate of Potash.

℞. Tincturæ Ferri Perchloridi, fl. drs. 1½; Potassæ Chloratis, gr. 120; Liquoris Arsenicalis, min. 15; Aquæ, ad fl. oz. 8. Mix. One-sixth part three or four times a day, in a wineglassful of water.
In certain skin diseases, onychia, &c. Also, in anæmia dependent on a syphilitic taint, in erysipelas about the fauces, and in tonsillitis, &c., omitting the solution of arsenic from the mixture.

403. Steel and Citrate of Potash.

℞. Ferri et Ammoniæ Citratis, gr. 60; Spiritus Ammoniæ Aromatici, fl. drs. 4; Potassæ Bicarbonatis, gr. 120; Infusi Calumbæ, ad fl. oz. 8. Mix. One-sixth part to be taken twice a day with one tablespoonful of lemon-juice.
As a tonic during convalescence from many acute diseases, especially where there is a tendency to nausea and dyspepsia.

404. Steel and Aloes.

℞. Ferri Carbonatis Saccharatæ, gr. 40; Infusi Anthemidis, fl. oz. 8. Mix. One-sixth part twice a day. The following draught is also to be taken every other morning, before breakfast: ℞. Sodæ Phosphatis, gr. 120; Extracti Rhei, gr. 10; Decocti Aloes Compositi, fl. drs. 4; Aquæ Carui, fl. oz. 1. Mix.
Useful for atonic gouty subjects.

℞. Ferri Redacti, gr. 30; Pilulæ Aloes et Myrrhæ, gr. 24—40; Extracti Nucis Vomicæ, gr. 4. Make a mass, divide into twelve pills, and order one to be taken three times a day.
In anæmia, with constipation.

℞. Misturæ Ferri Compositæ, Decocti Aloes Compositi, ää fl. oz. 4; Zinci Sulphatis, gr. 12. Mix. One-sixth part twice a day.
In anæmia, hypochondriasis, general debility, with constipation, &c.

405. Phosphate of Iron.

℞. Ferri Phosphatis, gr. 40; Acidi Phosphorici Diluti, fl. drs. 1½; Syrupi Aurantii Flores, fl. oz. 1; Mucilaginis Tragacanthæ, ad fl. oz. 8. Mix. One-sixth part three times a day.
In scrofula, cancer, low nervous vigor, &c.

℞. Ferri Phosphatis, gr. 20; Pulveris Myrrhæ, gr. 15; Sacchari Albi, gr. 30. Mix, and divide into six powders. One to be taken night and morning.
In rickets, and in all the strumous diseases of children.

A syrup of the Phosphates of Iron, Lime, Soda, and Potassa, has been prepared by Mr. Parrish, of Philadelphia. It may be obtained from most London chemists; being known as "Chemical Food." The dose for a child, ten years of age, is one teaspoonful in water, after the two principal meals of the day. This measure con-

tains one grain of phosphate of iron; two and a half grains of phosphate of lime: and smaller portions of the alkaline phosphates.

Chemical Food is a preparation of great value in all forms of strumous disease, and general debility.

406. Steel and Manganese.

℞. Ferri Phosphatis, gr. 120; Manganesii Phosphatis, gr. 90; Tincturæ Calumbæ, fl. oz. 1; Syrupi Zingiberis, fl. oz. 2. Mix. One teaspoonful in a wineglassful of water three times a day.

In chlorosis, scrofula, &c.

407. Acetate of Strychnia.

℞. Strychniæ Acetatis, gr. 1; Acidi Acetici, min. 20; Alcoholis, fl. drs. 2; Aquæ Destillatæ, fl. drs. 6. Mix. Ten drops (= to gr. $\frac{1}{50}$) to be taken in water three times a day.

Recommended by Dr. Marshall Hall, as a tonic in cases of nervous exhaustion.

℞. Strychniæ, gr. 1; Pulveris Zingiberis, gr. 40; Extracti Gentianæ, gr. 60. Mix very thoroughly, divide into twenty pills, and order one to be taken night and morning.

In partial paralysis, amaurosis, &c., when the acute symptoms have subsided.

408. Strychnia and Steel.

℞. Ferri et Ammoniæ Citratis, gr. 40; Liquoris Strychniæ, min. 30 (= to gr. $\frac{1}{4}$); Infusi Quassiæ, ad fl. oz. 8. Mix. One-eighth part twice a day.

In chronic nervous affections with debility.

℞. Ferri Redacti, gr. 40; Zinci Valerianatis, gr. 20; Strychniæ, gr. 1; Glycerini, sufficient to make a mass. Divide very carefully into twenty pills, silver them, and direct one to be taken three times a day, after food.

In hypochondriasis, great nervous depression, &c.

409. Zinc and Nux Vomica.

℞. Zinci Sulphatis, gr. 24; Extracti Nucis Vomicæ, gr. 6; Extracti Rhei, gr. 30. Make a mass, divide into twelve pills, and order one to be taken twice a day.

In weakness of the muscular system, atony of intestinal walls, &c. See F. 177, 387.

410. Valerianate of Zinc.

℞. Zinci Valerianatis, gr. 12—24; Extracti Belladonnæ, gr. 3—6; Extracti Gentianæ, gr. 24. Make a mass, divide into twelve pills, and silver them. One to be taken three times a day.

In some nervous disorders, in cases of habitual constipation, and in spasmodic contraction of the sphincter ani.

℞. Zinci Valerianatis, Zinci Phosphatis, āā gr. 10; Extracti Rhei, gr. 24. Make a mass, divide into twelve pills, and silver them. Order one to be taken three times a day.

For epilepsy, neuralgia, hysteria, &c. The valerianate of quinine, of soda, of ammonia, and of steel, may be employed in the same manner. In some cases of neuralgia as many as twelve or twenty grains of valerianate of ammonia in infusion of calumba have been given every four hours.

411. Valerianate of Zinc and Quinine.

℞. Zinci Valerianatis, gr. 12; Quiniæ Sulphatis, gr. 6; Pilulæ Rhei Compositæ, Extracti Anthemidis, āā gr. 20. Make a mass, divide into twelve pills, and silver them. One to be taken three times a day.

In hysteria, neuralgia, &c.

412. Valerianate of Steel and Savin.

℞. Ferri Valerianatis, gr. 24; Olei Sabinæ, min. 24; Pilulæ Assafœtidæ Compositæ, gr. 30. Make a mass, divide into twelve pills, and silver them. One to be taken three times a day.

In anæmia, hysteria, and neuralgia with amenorrhœa.

413. Sulphate of Zinc.

℞. Zinci Sulphatis, gr. 24; Extracti Aconiti, gr. 12; Extracti Quassiæ, gr. 24. Make a mass, divide into twelve pills, and order one to be taken three times a day.

In epilepsy with neuralgic pains, lumbago, pleurodynia, &c. Its efficacy is much increased by giving cod-liver oil at the same time.

℞. Zinci Sulphatis, gr. 12—24; Extracti Conii, gr. 36. Make a mass, divide into twelve pills, and order one to be taken three times a day.

In the chronic bronchitis of old people as a tonic and sedative, &c.

414. Phosphate of Zinc, &c.

℞. Zinci Phosphatis, gr. 20—40; Acidi Phosphorici Diluti, fl. drs. 1½; Tincturæ Cinchonæ Flavæ, fl. drs. 6, *vel* Tincturæ Ferri Perchloridi, fl. drs. 1½; Aquæ Menthæ Piperitæ, ad fl. oz. 8. Mix. One-sixth part three times a day.

In some affections of the nervous system with debility.

℞. Zinci Phosphatis, gr. 20; Extracti Nucis Vomicæ, gr. 5; Extracti Gentianæ, gr. 20. Mix. Divide into twenty pills, silver them, and order one to be taken twice a day.

415. Oxide of Zinc.

℞. Zinci Oxidi, gr. 24—40; Extracti Anthemidis, gr. 30. Make a mass, divide into twelve pills, and order one to be taken twice a day.

In chronic alcoholism (?), chorea, hysteria, &c. Dr. Golding Bird entertained an opinion that zinc has a specific influence on the nervous system, just as iron has on the blood. The does may be gradually increased until twenty or even thirty grains of the zinc are taken in the day. It can sometimes be advantageously combined with opium.

416. Zinc, Bark, and Glycerin.

℞. Zinci Sulphatis, gr. 12—20; Tincturæ Cinchonæ Compositæ, fl. oz. 1; Glycerini, fl. drs. 12; Aquæ Menthæ Piperitæ, ad fl. oz. 8. Mix. One-sixth part three times a day.

During convalescence from acute disease, especially where there is emaciation with great nervousness and constipation.

417. Phosphorus Pills.

℞. Micæ Panis, gr. 60; Aquæ Destillatæ, sufficient to make a mass. Then add, Phosphori, gr. 1; mix thoroughly, divide into twenty pills, and order one to be taken thrice daily.

In extreme debility and mental depression. After cholera, diphtheria, &c.

418. Phosphorus and Oil.

℞. Phosphori, gr. 1; Olei Morrhuæ, fl. oz. 6. Mix. One or two teaspoonfuls three times a day, immediately after food.

In tuberculosis, rickets, scrofula, &c.

℞. Phosphori, gr. 1; Olei Amygdalæ, fl. oz. 3. Mix. One teaspoonful in a wineglassful of barley-water three times a day.

419. Hypophosphite of Soda.

℞. Sodæ Hypophosphitæ, *vel* Calcis Hypophosphitæ, gr. 30—90; Infusi Chiratæ, fl. oz. 8. Mix. One-sixth part three times a day.

In phthisis, tabes mesenterica, &c. In progressive locomotor ataxy the efficacy of this mixture may be increased by giving a pill containing Nitrate of Silver (F. 59) with each dose.

℞. Sodæ Hypophosphitis, gr. 80—240; Spiritûs Ætheris, fl. oz. 1; Tincturæ Sumbulis, *vel* Tincturæ Cinchonæ Flavæ, fl. oz. 2; Aquæ, fl. oz. 3. Mix. One dessertspoonful in a large wineglassful of water three times a day.

In epilepsy, hysteria, neuralgia, some forms of hypochondriasis, &c., this mode of administering phosphorus may be useful. The dose at first should be moderate and then gradually increased. In very obstinate or severe cases of neuralgia, a

cure may perhaps be effected by the hypophosphite of soda in forty or even sixty-grain doses, repeated thrice daily, when the ordinary quantities have no effect. Where no appreciable benefit ensues in five or six days, the remedy will probably prove useless however long it may be continued.

420. Preparations of Pepsin.

The physician is sometimes hindered in the administration of tonics and cod-liver oil and animal food by the inability of the stomach to digest them. And this frequently happens where these restoratives are most needed,—in cases of degeneration of tissue, in lingering illness, and during convalescence from acute disease.

The food is subjected in the stomach to the action of the gastric juice; a secretion consisting of water, probably of lactic and hydrochloric acids, and of an azotized substance having the nature of a ferment,—pepsin. When from any cause the secretion of the gastric glands is deficient or arrested, recourse may be had to the use of artificial pepsin with great advantage. The substance is usually prepared from several rennet-bags (the fourth stomach of the ruminants), by washing them and scraping off the mucous membrane. The latter is then reduced to a pulp, macerated in distilled water for twelve or twenty-four hours, and filtered. A sufficiency of acetate of lead is added to the liquor, the precipitate is collected, and a current of sulphuretted hydrogen passed through it. Then it is again filtered, evaporated at a low temperature, and the dry residue (pepsin) powdered. The chief symptoms which call for the use of this agent, are imperfect or slow digestion, with flatulence, acid eructations, nausea, low spirits, and lassitude; diarrhœa, with portions of undigested food in the evacutions; phthisis, cancer, and other diseases attended with great debility; and affections of the stomach itself,—as gastric ulcer, malignant disease of the pylorus, &c. It is also beneficial in anæmia chlorosis, in habitual constipation, want of appetite, offensive breath, dilated stomach, morbidly fetid stools, and sometimes in the sickness of pregnancy.

Pepsin should be given alone, or it may be mixed with certain medicines without its properties becoming deteriorated. Thus, when severe pain follows the ingestion of food, the sixth of a grain of morphia can be added to each dose; when there is pyrosis, fifteen grains of the white bismuth; when the peristaltic movements are sluggish, the twentieth or twenty-fifth part of a grain of strychnia; and when there is anæmia, some preparation of steel—particularly the reduced iron, or the citrate of iron and quinia. It is a common occurrence for patients to be enabled to assimilate ferruginous tonics and cod-liver oil by the aid of pepsin, who cannot do so without.

There are several preparations of this agent which may be used. In Boudault's *Poudre Nutrimentive*, as purchased from Mr. Squire, the pepsin is mixed with starch in such proportions, that one part of the powder so formed will have the power of digesting four parts of fibrin at a temperature of 98° Fahr. Thus, fifteen grains of the powder will probably cause the meat of a mutton-chop to be digested in the stomach. This, then, is the ordinary dose; and it should be taken at the commencement of the meal, either between two pieces of bread, or in a tablespoonful of lukewarm soup.

Morson's *Pepsin Wine* is obtained from the gastric juice of the calf's stomach. It is an agreeable, slightly acidulous wine; the dose being one teaspoonful in water. The *Pepsin Lozenges* prepared by the same chemist are convenient and agreeable.

Bullock and Reynolds's *Pepsina Porci* is procured, as its name implies, from the stomach of the pig. In a short series of experiments its action was found by the author superior to that of most other kinds. The dose is from two to five grains, made into a pill with glycerin.

And lastly there is the *Rennet* or *Pepsin Wine* of Dr. Ellis, of Dublin, the preparation of which may be thus described. Take the stomach of a calf as fresh as it can be obtained from the butcher: cut off about three or four inches of the upper or cardiac extremity, which containing few glandular follicles, may be thrown away. Slit up the organ longitudinally; and wipe it gently with a dry napkin, taking care to remove as little of the clean mucus as possible. Then cut it into small pieces (the smaller the better), and put all into a common wine bottle. Fill up the bottle with good sound sherry, and let it remained corked for a fortnight; at the end of this time it is fit for use. The dose is a teaspoonful in a wineglassful of water immediately after meals. Dr. Ellis also suggests this test for pepsin: Put a small cup containing milk in a vessel of hot water until the milk becomes blood warm. Then add a teaspoonful of rennet wine; and if it be genuine, the milk in two or three minutes will become as solid as blancmange. See F. 389, 394.

XVIII. UTERINE THERAPEUTICS.

421. Ferruginous Emmenagogues.

℞. Potassii Iodidi, gr. 18—30; Ferri et Ammoniæ Citratis, gr. 40; Tincturæ Nucis Vomicæ, fl. drm. 1; Infusi Quassiæ, ad fl. oz. 8. Mix. One-sixth part three times a day.

In amenorrhœa with a torpid circulation.

℞. Syrupi Ferri Iodidi, Glycerini, āā fl. oz. 1; Olei Limonis, min. 10. Mix. One teaspoonful in a wineglassful of water three times a day. See F. 32.

℞. Pilulæ Ferri Carbonatis, gr. 30; Pilulæ Cambogiæ Compositæ, gr. 15; Olei Sabinæ, min. 12. Make a mass, divide into twelve pills, and order two to be taken wice a day.

In amenorrhœa with anæmia and habitual constipation.

℞. Ferri Valerianatis, gr. 18; Olei Sabinæ, min. 24; Extracti Aloes Barbadensis, gr. 6; Pilulæ Assafœtida Compositæ, gr. 36. Mix thoroughly, and divide into twelve pills. One to be taken three times a day.

In amenorrhœa with hysteria. See F. 412.

℞. Tincturæ Ferri Perchloridi, fl. drs. 1½; Potassæ Chloratis, gr. 60; Tincturæ Actææ Racemosæ, fl. drs. 4; Infusi Serpentariæ, ad fl. oz. 8. Mix. One-sixth part three times a day.

In debility, with imperfect menstruation, pains in the back, and an irritable condition of the buccal or gastric mucous membrane. See F. 320.

422. Stimulant Emmenagogues.

℞. Extracti Ergotæ Liquidi, fl. drs. 3; Tincturæ Serpentariæ, fl. drs. 6; Tincturæ Nucis Vomicæ, fl. drm. 1; Decocti Aloes Compositi, ad fl. oz. 8. Mix. One-sixth part early every morning.

In amenorrhœa dependent on simple atony of the uterine organs.

℞. Potassii Bromidi, gr. 60; Tincturæ Cantharidis, fl. drs. 1½; Tincturæ Cinnamomi, fl. drs. 6; Aquæ, ad fl. oz. 8. Mix. One-sixth part three times a day.

In amenorrhœa with epileptoid seizures.

℞. Olei Rutæ, min. 15; Extracti Ergotæ Liquidi, fl. drs. 2; Mucilaginis Tragacanthæ, ad fl. oz. 8. Mix. One-sixth part three times a day.

℞. Boracis, gr. 60; Tincturæ Ergotæ, fl. drs. 4; Aquæ Cinnamomi, ad fl. oz. 8. Mix. One-sixth part three times a day.

℞. Tincturæ Hellebori (Phar. Lond. 1851), fl. drs. 3; Syrupi Zingiberis, fl. drs. 6; Infusi Sennæ, ad fl. oz. 8. Mix. One-sixth part once or twice a day.

In amenorrhœa with torpid action of the bowels.

℞. Liquoris Strychniæ, min. 30; Tincturæ Ferri Perchloridi, fl. drs. 1½; Tincturæ Actææ Racemosæ, fl. drs. 4; Infusi Quassiæ, ad fl. oz. 8. Mix. One-sixth part three times a day.

℞. Podophylli Resinæ, gr. 6; Extracti Hyoscyami, gr. 24; Extracti Nucis Vomicæ, gr. 4; Pilulæ Aloes et Myrrhæ, gr. 30. Mix, and divide into twelve pills. One to be taken at bedtime for three or four nights in succession.

Where the menstrual flow is scanty, and the liver sluggish.

423. Medicated Vaginal Pessaries.

℞. Plumbi Iodidi, gr. 80; Extracti Belladonnæ, gr. 24—40; Extracti Conii, gr. 100; Olei Theobromæ, oz. 1—1½; Olei Olivæ, fl. drs. 2. Mix; melt into a mass with gentle heat; and pour it into a tube or roll of paper, about eight inches long and of the circumference of the little finger. Divide into eight pessaries; and order one to be introduced into the vagina every night, or every other night.

In chronic inflammation and induration of the labia uteri, in ovaritis, in pelvic cellulitis, and in chronic cystitis.

For an account of the advantages of cacao butter (oil of theobroma) over other materials in making these pessaries the reader is referred to a paper by the author in the Obstetrical Transactions, vol. iv, p. 205, London, 1863.

℞. Unguenti Hydrargyri, gr. 80—120; Olei Theobromæ, oz. 1—1½; Olei Olivæ, fl. drs. 2. Mix. Divide into eight pessaries. Where there is tenderness of the cervix uteri, or of the ovaries, thirty grains of Extract of Belladonna or eighty grains of Extract of Conium should be added to the mass.

℞. Iodoformi, gr. 80; Olei Theobromæ, oz. 1; Glycerini, fl. drs. 2. Mix. Divide into eight pessaries.

As a local anæsthetic in cancerous and other painful uterine diseases.

The smell of iodoform renders these pessaries very unpleasant to many patients.

℞. Extracti Aloes Socotrinæ, gr. 60; Olei Sabinæ, fl. drm. 1; Olei Theobromæ, oz. 1; Olei Olivæ, fl. drs. 2. Mix. Divide into eight pessaries, and order one to be introduced into the vagina every night.

As an emmenagogue and purgative.

℞. Plumbi Acetatis, gr. 20; Extracti Opii, gr. 24; Olei Theobromæ, oz. 1; Glycerini, fl. drs. 2. Mix. Divide into eight pessaries, and order one to be used every night.

In chronic leucorrhœa, acute and follicular vaginitis, &c.

℞. Zinci Oxidi, *vel* Bismuthi Carbonatis, gr. 80; Extracti Belladonnæ, gr. 40; Olei Theobromæ, oz. 1; Olei Olivæ, fl. drs. 2. Mix. Divide into eight pessaries.

In the same cases as the preceding. Also in cancer of the cervix uteri, and in severe irritability of the bladder.

℞. Potassæ Permanganatis, gr. 24; Extracti Aconiti, gr. 12; Extracti Opii, gr. 16; Olei Theobromæ, oz. 1—1½. Mix. Divide into eight pessaries and order one to be used every night.

In uterine diseases attended with pain and offensive discharges. In cancer advanced to the stage of ulceration the quantity of the permanganate should be reduced about one-third.

℞. Potassii Iodidi, gr. 40; Extracti Conii, gr. 120; Olei Theobromæ, oz. 1; Olei Olivæ, fl. drs. 2. Mix. Divide into eight pessaries. One to be used every night.

In induration of the labia uteri in strumous subjects.

℞. Acidi Tannici, gr. 120; Pulveris Catechu, gr. 60; Olei Theobromæ, oz. 2; Olei Olivæ, fl. drs. 2. Mix. Divide into eight pessaries, and order one to be used twice a week.

In prolapsus uteri with relaxation of the vaginal tissues, as well as in uterine hemorrhage and in menorrhagia.

424. Medicated Uterine Pessaries.

℞. Acidi Tannici, Olei Theobromæ, āā oz. ½. Mix. Divide into eight pessaries, each having the diameter of an ordinary stick of nitrate of silver.

In uterine hemorrhage with a patulous condition of the os uteri, one of these pessaries may be introduced up the canal of the uterus and left there. It soon dissolves and coats the lining membrane with the tannin.

℞. Aluminis, gr. 80; Zinci Sulphatis, gr. 40; Olei Theobromæ, oz. ½. Mix. Divide into eight pessaries as in the preceding formula.

℞. Unguenti Hydrargyri, Olei Theobromæ, āā gr. 200; Extracti Belladonnæ, gr. 20. Mix, and divide into eight pessaries as in the first of these formulæ.

425. Vaginal Injections.

℞. Extracti Hæmatoxyli, oz. 1; Aluminis, gr. 120; Aquæ, fl. oz. 2. Mix, and label,—"To be added to one pint of cold water to form an injection." Like other vaginal injections, this one is to be used with a vulcanized India-rubber siphon syringe, a pint or more of plain water being first thrown up.

In diseases attended with an offensive discharge. The patient should be cautioned that the fluid will dye linen, &c., soiled with it.

℞. Zinci Sulphatis, Aluminis Exsiccatæ, āā oz. 1; Acidi Tannici, oz. 2. Mix. Label,—"One teaspoonful to be mixed with a pint of tepid or cold water to form an injection."

In leucorrhœa, gonorrhœa, &c.

℞. Zinci Chloridi, gr. 160; Aquæ, fl. oz. 8. Mix. Label,—"One teaspoonful to be mixed with a pint of cold water to form an injection. To be used night and morning."

In gonorrhœa.

℞. Liquoris Plumbi Subacetatis, fl. oz. 6; Extracti Papaveris, oz. 2. Mix, and label,—"One large tablespoonful to be mixed with a pint of warm or tepid water to form an injection."

In cases of leucorrhœa, with an irritable condition of the os uteri or vagina, as well as in rodent ulcer of the uterus.

℞. Extracti Papaveris, oz. 1½; Tincturæ Belladonnæ, fl. drs. 4. Mix, and label,—"Two teaspoonfuls to be added to one pint of linseed tea, to form an injection."

As a soothing remedy in cancer of the cervix uteri, when there is but little tendency to hemorrhage. It may be employed twice or thrice in the twenty-four hours.

426. Sponge-tents, &c.

For the purpose of dilating the mouth and cavity of the uterus, the female urethra, a strictured rectum, or a contracted orifice of the male prepuce, nothing can be better than the sponge-tents introduced into obstetric practice by Sir James Simpson. These instruments are of a narrow conical form and of various sizes. They are made by dipping a piece of sponge into water and then compressing it around a central wire with whipcord. After drying, the cord is removed, the surface of the tent being then coated with a mixture of lard and wax, while three or four inches of tape are fastened to its base. The tents which the author has generally used have been made by Duncan Flockhart of Edinburgh, and they are perfect. A metallic director, somewhat resembling the uterine sound, with a sharp point, is needed for their introduction up the uterine canal, while their removal is accomplished by pulling the tape. A fresh tent must be introduced every twenty-four or forty-eight hours, until the tissues are sufficiently dilated to allow the finger to explore the cavity of the uterus.

Dr. Sloan, of Ayr, has suggested the use of the dried stem of the sea-tangle (Laminaria digitata) as a substitute for sponge. The stem of this common marine plant is cylindrical, soft, flexible, firm, and capable of being greatly reduced in size by drying. On subsequently being supplied with sufficient moisture it dilates to at least three or four times its size. The tangle-tents produce equable dilatation, are in all respects very efficient, are cleanly, and ought to be cheap. They are more easily introduced into the uterus than the sponge-tents, but they are also more liable to slip out again when the pressure of the finger is removed. In employing these tents it seems best to dip them in hot water just prior to introducing them, avoiding the use of oil, as it interferes with their absorbing power.

Tents may also be made of gentian and of elm bark, but the author has had no experience with these kinds, having been perfectly satisfied with the sponge and sea-tangle.

427. Galactophora and Galactophyga.

a. GALACTOPHORA [Γάλα = milk + φέρω = to bear], or GALACTAGOGUES [Γάλα + ἄγω = to drive out], are remedies which increase the secretion of milk. Defective lactation is not common among healthy mothers, but with the weak and delicate it is very frequent. When it arises amongst the first class it is generally due to overfeeding; when amongst the second, anæmia is its cause. In either class, a torpid condition of the mammary gland may be its source.

Defective lactation from plethora will be best treated by purgatives, the most efficient being castor oil. All kinds of beer, wine, and spirits are to be prohibited. Animal food is to be allowed, with vegetables, bread, tea, &c. A mixture of milk and soda-water, in equal parts, forms an excellent drink in these cases. The patient is not to be weakened, but she should be cautioned against the vulgar error, that a large quantity of food is necessary simply because she is nursing.

Defective lactation from anæmia is not uncommon. When the weakness is not such as to forbid suckling, the health ought to be improved by animal food, by a fair allowance of ale or porter or wine, and by taking milk, or cocoa made with milk, instead of tea and coffee. A raw egg beaten up in a tumblerful of milk, once or twice a day, will do good. Then ammonia and bark (F. 371) may be given, or some non-astringent ferruginous tonic (F. 403, 405), or cod-liver oil.

Defective lactation from torpor of the mamma is the most frequent variety. In these cases benefit will be derived from irritating the gland and nipple,—as by the careful use of the breast-pump, by drawing out the nipple several times with the

fingers before the infant is applied; by passing an electric current through the gland, for fifteen or twenty minutes daily, for several days in succession; or by the application of a hot carrot poultice during some hours daily. The breasts are to be kept warm. Moderate sexual intercourse is also useful. Beef and mutton, game and poultry, white fish, oysters, stewed eels, potatoes, parsnips, lettuce, carrots, turnips, &c., will increase the secretion. There is no objection to stout or to any other kind of malt liquor, provided the stomach can digest it, while from one to two pints of cow's milk should be allowed daily. With regard to drugs, perhaps the most efficacious is a decoction of the leaves and stalks of the *Ricinus communis* or *Castor-oil plant*. Dr. Routh recommends the administration of a strong decoction of this plant or of an extract, the dose of the former being from one to two drachms daily in water, or of the latter five grains. The castor-oil leaves may also be applied over the breasts, or an infusion of them can be used with lint and oiled silk. Amongst other remedies reputed to possess galactagogue properties must be mentioned, *Aqua anethi* or *Dill-water*, and *Oleum Anethi*; *Aqua Anisi* or *Aniseed-water*, and *Oleum anisi*; and particularly *Aqua Fœniculi* or *Fennel-water*, and *Oleum Fœniculi*. The dose of either of these waters is from two to four ounces, and of the oils about five minims on a lump of sugar twice or thrice daily. The value of such agents as the *Malva Sylvestris* or *Marsh-mallow*, of the *Saponaria vaccaria* or *Cow basil*, of the juice or decoction of *Broom-tops*, and of the infusion of *Althæa root*, is very doubtful.

Sore nipples may indirectly be the cause of defective lactation. Slight excoriations, as well as chaps and fissures, can generally be healed by the use of the dilute solution of subacetate of lead, or by the liniment of lime, or by an ointment of balsam of Peru, or by a lotion containing borax and glycerin, or by the glycerin of starch. Frequently drying the nipple with a soft rag, and then dusting it with spermaceti which has been finely powdered by the aid of a few drops of proof spirit, will be found exceedingly efficacious. Where the fissures are deep, light cauterization with nitrate of silver often answers well; or the painful spots may be painted with collodium, leaving the summit of the nipple free for the escape of the milk. A well-made shield, provided with an artificial nipple, will often enable a woman to suckle when she would otherwise be unable to do so. The child's mouth must be looked to, so that if there are aphthæ they may be cured.

β. GALACTOPHYGA [Γάλα = milk + φεύγω = to shun] are the remedies employed to arrest the secretion of milk.

Extract of Belladonna, is I believe the most certain agent of this kind. Reduced to the consistence of treacle, by the addition of a little glycerin or water, it should be freely painted over each breast, night and morning; the parts being also covered with wet lint and oiled silk, or with a cold bread-and-water poultice. At the same time, one-quarter or one-third of a grain of the extract, may be administered twice or thrice daily, if a speedy effect be desirable. Sometimes it is advantageously given with quinine and camphor (F. 383).

Iodide of Potassium often succeeds, and is particularly useful if there be any painful engorgement of the glands. Six or nine grains daily, in divided doses, should be administered. Occasionally it may be better to give about ten minims of the tincture of belladonna with each dose; or the iodide can be combined with an active purgative salt, as the sulphate of magnesia (F. 31).

Colchicum has not succeeded well in the author's hands when given alone. But combined with the sulphate of magnesia, in the proportion of twenty minims to sixty grains, administered two or three times a day, it has appeared serviceable.

Camphor has been recommended. Three or four grains, with the same quantity of henbane, may be given in a couple of pills at bedtime; while frictions with the camphor liniment, or the compound camphor liniment, had better be employed twice or thrice daily.

Tobacco acts in a similar manner to belladonna. An ointment, made by boiling half an ounce of fresh tobacco in eight ounces of lard, is to be kept continually applied. Or this remedy may be employed in the form of a fomentation.

Sage tea is a popular remedy, which can certainly do no harm.

428. Aphrodisiacs and Anaphrodisiacs.

α. APHRODISIACS [Ἀφροδίσια = venery] are medicines which excite or increase the sexual powers.

Many remedies have been supposed to act as sexual stimulants, but the majority of those which have been recommended merely have the property of exciting the imagination. This is especially the case with *Musk*, *Castoreum*, and *Ambergris*; extravagant substances, which ladies may use as perfumes if they please, but which should be abolished from the Materia Medica. The volatile sulphurated or allyle

oils, obtained from alliaceous and cruciferous plants (*Allium sativum*, *Allium cepa*, *Sinapis nigra*, *Cochlearia Armoracia*, *&c.*) have had some slight repute. *Indian hemp* and *Opium* have been used; but the latter, at least, generally exercises a contrary effect to that desired. *Cantharides*, *Turpentine*, and *Borax* probably possess no aphrodisiac powers, though popularly thought to do so. The only remedies which may truly be supposed to act as sexual stimulants are the various preparations of *Iron*, *Strychnia and Nux Vomica*, *Quinine*, and *Phosphorus*.

β. ANAPHRODISIACS ['A = priv. + ἀφροδίσια = venery] are generally believed to have the power of repressing the sexual feelings.

Nauseants (*Tartarated Antimony* and *Ipecacuanha*), drastic purgatives (*Elaterium*, *Jalap*, *Calomel*, *&c.*), *Camphor* in large doses, *Carbonate of Soda*, *Hemlock*, *Tobacco*, and *Alcoholic drinks*, probably possess anaphrodisiac properties.

XIX. CLIMATES FOR INVALIDS.

429. General Observations.

Notwithstanding the excellent writings of Sir James Clark, Edwin Lee, Granville Burgess, Alexander Taylor, D. J. T. Francis, Scoresby-Jackson, and others, many invalids migrate every autumn to the South of France, Italy, Spain, &c., merely to find a grave. This happens partly because cases of far-advanced disease are still sent abroad, when they ought to be kept at home; partly, because a situation unfavorable to the particular malady is selected, the laws of climate being ill understood; and, in some measure, because it is difficult to persuade the sick that simple change to another country is only one of the means by which they are to regain health. For although there can be no doubt that in change of air physicians have an efficient remedial agent, yet it is certain that this remedy, like all others, is not of indiscriminate application, but must be prescribed with judgment and discretion.

The diseases most likely to be cured or alleviated by the benign influence of change of climate are the following: Pulmonary consumption; chronic laryngeal and bronchial affections; asthma; disorders of the digestive organs, with the various forms of dyspepsia; chronic gout and rheumatism; functional derangements of the sexual organs; affections of the kidneys; obstinate neuralgia; and hypochondriasis. A change is beneficial to strumous delicate children; is invaluable as a restorative during convalescence from acute or prolonged disease; and especially is it one of the chief resources of "preventive medicine." In incurable disease a visit to another part of the sufferer's country, or to some foreign station, will now and then serve to ward off complications, to give mental exhilaration, to promote appetite and digestion, and to be the source of tranquil nights.

There is no model climate; no country can boast of being perfect. All that the physician's knowledge and tact will enable him to do is to select that situation which possesses the greatest advantages and the fewest drawbacks for the particular case he has in hand. Phthisis, for example, is prevalent and fatal in all countries, though more so in some than others. Moreover, it must be remembered, that through the peculiar nature of zymotic [ζυμόω = to ferment] diseases, towns usually healthy are apt to be periodically visited by epidemics; and such places can only be avoided by consulting recent returns, or by instituting inquiries on the spot. In considering the sanative influence of any climate, our chief object must be to learn on how many days during the winter and spring months it may be expected that the invalid will be confined to the house by bad weather. If the number be at all large, he can just as well remain at home. To decide the point, the nature of the sick man's disease and constitutional strength must first be determined. Then as regards any given locality attention must be paid to its aspect, its drainage, and its elevation above the sea level; to the temperature and its equability; to the dryness or moisture of the soil and atmosphere, a degree of heat being often well borne when the air is dry, which is quite unbearable when it is moist; and to the nature of the prevalent winds. The amount of rain which descends in a season is not of such moment as the way in which it usually falls; a region liable to sharp heavy showers being much more favorable for the invalid, than one where it drizzles—like a Scotch mist—for days together. Luxuriant vegetation, though agreeable to the senses, may merely mean high temperature combined with moisture; conditions not favorable for the phthisical. So also the districts where marshy lands abound, or where occasional inundations occur, are notoriously unhealthy; for the evaporation of the

water lowers the temperature, while the decaying vegetable matter becomes the source of malaria.

The beneficial effects of sea air are due to its purity, to the equability of its temperature, to the iodine it contains, and to the constant presence of ozone The latter—the most powerful oxidizing agent known—is a stimulant to all the vital functions; but if in excess it causes great irritation, particularly of the organs of respiration. Ozone, found also in the air of mountainous and rural districts, has the property of decomposing iodide of potassium, uniting with the potassium and liberating the iodine, which latter body may be detected by starch. Hence, test-papers saturated with a solution of iodide of potassium and starch are employed; the iodine, when freed by the ozone, uniting with the starch and forming blue iodide of starch. (See F. 389.) While sea air by its invigorating and other properties has a certain amount of influence in preventing tuberculosis, it is by itself insufficient to cure this disorder. Mountain air is also pure, has an average low temperature, and contains a large proportion of ozone. There is a diminution of atmospheric pressure, but more wind and moisture at high elevations. Speaking generally, mountain air is tonic and bracing; it improves the appetite, lessens anæmia, and especially promotes a healthy action of the abdominal viscera.

Although a classification of climates can only be artificial, and merely useful as affording a rough view of their nature, yet those countries most resorted to by invalids may be arranged in four divisions, viz.: the relaxing, sedative, exciting, and bracing.

1. In the *relaxing* climates (*e. g.*, Pisa, Madeira, Torquay) there is an elevated temperature with an excess of communicable humidity. They are unfitted for cases where we wish to restore diminished tone—to build up shattered constitutions; as well as for subjects with a tendency to hemorrhage.
2. In the *sedative* climates (Rome, Pau, Cannes, Venice) we find a freedom from great dryness on the one hand, and from communicable humidity on the other. We should not select these where it is desirable to quicken a slow circulation, or where the secretions are too abundant.
3. In the *exciting* climates (Nice, Naples, Montpellier, Florence, Genoa, &c.) there is an excess of dryness, a highly electric state of the air, an excess of ozone, and during the early months of the year keen irritating winds. Such climates are injurious where there is nervous and vascular excitement, a tendency to inflammation, or where functional repose is needed.
4. In the *bracing* climates (Southport, Brighton, Mentone, Malaga, Algiers, &c.) the winter temperature, while comparatively high, is not oppressive, the air contains a moderate portion of ozone, there is a certain amount of dryness, and the winds are less irritating than in the exciting class. They are generally to be avoided where there is a very sensitive state of the system, a tendency to apoplexy from hyperæmia, and in many affections of the heart or large vessels. But, as a general rule, they are more suited to cases of pulmonary consumption, and to renal and hepatic diseases than either of the others.

It would be of little practical use to introduce an extended table, giving an approximation to the death-rate of different countries. But it is interesting to shortly notice, that on an average of ten years (1851—60), the annual mortality from all causes stands thus:

For England and Wales,	population in	1861	being	20,066,224,	the deaths are	20	to each	1000 persons living.
" London,	"	"	"	2,803,989,	"	24	"	"
" Bristol,	"	"	"	66,027,	"	27	"	"
" Birmingham,	"	"	"	212,621,	"	27	"	"
" Manchester,	"	"	"	243,988,	"	31	"	"
" Liverpool,	"	"	"	269,742,	"	33	"	"
" Dover,	"	"	"	31,575,	"	20	"	"
" Hastings,	"	"	"	26,631,	"	18	"	"
" Eastbourne,	"	"	"	10,721,	"	17	"	"
" Brighton,	"	"	"	77,693,	"	22	"	"
" Worthing,	"	"	"	18,921,	"	18	"	"
" Isle of Wight,	"	"	"	55,362,	"	17	"	"
" Scarborough,	"	"	"	30,425,	"	21	"	"
For Paris,	population in	1862	numbering	1,696,141,	the deaths are	28	to each	1000 persons living.
" Berlin,	"	1861	"	547,571,	"	25	"	"
" Vienna,	"	1861	"	512,000,	"	49	"	"
" Turin,	"	1858	"	179,635,	"	26	"	"
" St. Petersburg,	"	1858	"	520,131,	"	41	"	"
" Moscow,	"	1858	"	386,370,	"	38	"	"

When the locality to which an invalid is to resort has been decided upon, he should, on leaving home, be provided with a concise code of laws in writing; or he

must be directed at once to consult a physician in practice at the town selected. His route had better be marked out for him; he should be cautioned as to the rate at which he is to travel; rules must be laid down as to the regimen he is to adopt; while he ought to be reminded that warm clothing, especially flannel, will be required. Frequently it will be better to have cheerful apartments, with a southern aspect, secured beforehand; so that at the end of his journey, a few days' perfect rest may be enjoyed. The object of the tour ought to be clearly explained, while he is to be warned not to expect too much, especially at first. The physician, in sending his patient abroad, is merely placing him in the position most favorable to recovery,—but still where other remedies and general precautions will be indispensable. Foreign travel would be more agreeable to most men, could the plague of sight-seeking be dispensed with. But for the sick man to visit picture galleries, museums, damp old ruins, cold churches, &c., is frequently to frustrate the only object he should have in view, viz., the restoration of his health. In giving directions as to diet, it must be recollected that travelling is very exciting and wearying to the invalid; that the organs of digestion almost always become more or less deranged; and that many articles of food which are taken with advantage in England, disagree in warmer latitudes.

The best time for leaving England is about the middle or end of September. The patient with pulmonary disease ought not to return until May. In many instances, the author has found it advantageous for the invalid intending to stay away from home for several months to carry with him a few pure drugs; together with a brief account of their properties, doses, and modes of combination. Not that he is to be encouraged to tamper with his health by playing the dangerous part of the amateur physician; but good advice cannot always be procured, or it may, perhaps, be had where only inferior drugs are obtainable for compounding the prescription. The medicines which are generally ordered are these:

Sulphate of Quinia, 1 oz.	Chloroform, 2 fl. oz.
Reduced Iron, 1 oz.	Bicarbonate of Soda, 4 oz.
Liquid Extract of Yellow Cinchona, 4 fl. oz.	Compound Powder of Rhubarb, 6 oz.
Spirit of Ether, 6 fl. oz.	Aromatic Powder of Chalk and Opium, 3 oz.
Liquid Extract of Opium, 2 fl. oz.	Tincture of Arnica (for bruises, burns, &c.), 2 fl. oz.
Sulphate of Zinc (for emetics, lotions, collyria, &c.), 3 oz.	Morphia and Ipecac Lozenges, ½ to 1 lb.

Scales and weights: an ounce and a minim measure: a small spatula: an enema syringe, the cheaper and more simple the better: with lint and strapping, will complete the medical equipment. In certain special cases, it may be well to substitute for some of the above drugs, blue pill, iodide of potassium, colchicum, gallic acid, tincture of digitalis, pepsin, prepared from the pig's stomach, and oil of peppermint. Two invaluable medicines—brandy and cod-liver oil—can be procured everywhere. An air-cushion often proves serviceable.

La Poudre Insecticide is sold in France, and is a very efficacious remedy against fleas. One or two teaspoonfuls, sprinkled over the sheets, serve to destroy these foes to comfort and sleep. Persian Powder, made with the leaves of a kind of groundsel, will have a similar effect; and so will camphor, though in a less degree. Mosquito curtains may also be taken from England; for mosquitoes are a serious nuisance to all, but especially to the invalid, and they continue venomous in the south until the cold nights set in.

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430. Middlesex.

LONDON.—This city, the largest and most healthy in the world, is bounded by moderate hills; has a soil of loam and gravel, with clay resting on a bed of chalk; and is some fifty miles from the sea to the south and east. In 1861, the area of London was 122 square miles,—giving about 23,000 persons to a square mile of surface. The mean annual temperature is about 50° Fahr.: the average winter temperature being 38°, and that of the summer 63°. The nights especially are warmer than in the environs. The annual rainfall is 21.6 inches; the average number of days more or less wet being 178. Formerly certain springs, in the neighborhood of this city, were used for medical purposes. Thus, there were chalybeate springs at Hampstead

and Sadler's Wells: aperient waters at the Beulah Spa, Kilburn, and Streatham. The aperient salt, as at Epsom, was sulphate of magnesia.

Delicate invalids are often better in London, during the winter and spring, than in the country, owing to its greater warmth, and the greater steadiness of the temperature from day to day. Asthma is such a capricious disease, that it is impossible to say beforehand what particular climate will suit any special example of it. But it is certain that very many asthmatics are better and more free from attacks in a large city, than in the clearer atmosphere of the country. Sufferers from this affection can especially apply to themselves the words of Bacon,—"The goodness of the air is better known by experience than by signs." Phthisical invalids will find BROMPTON or CHELSEA the most sheltered spots of the metropolis; but if they are benefited by a bracing wind, they must resort to BAYSWATER or HIGHBURY, or the upper part of KENTISH TOWN, or to HIGHGATE.

HAMPSTEAD.—Many years ago, a mineral spring of repute in this village rendered it a fashionable watering-place. It is still a healthy suburb. From the heath, upwards of 200 acres in extent, there are many fine views. The air is pure and bracing, and well suited for children and convalescents. The low parts are damp and should be avoided. Like GREENWICH, RICHMOND, LEWISHAM, DULWICH, SYDENHAM, &c., Hampstead often affords a convenient temporary residence for families driven from their town homes by the outbreak of some eruptive fever or other infectious disease.

431. Kent.

MARGATE.—The tonic and bracing air of this familiar locality renders it a very valuable temporary residence for many invalids. The atmosphere is extremely pure, the soil is dry and absorbent, and the water-supply good. Perhaps no place could be named which is more suitable for restoring the health of children and young people afflicted with any form of scrofula. In strumous diseases of the joints, the most marked improvement usually results from a few months' stay at this town. The bathing is good; though the flatness of the sands may be a disadvantage to the adult.

The mortality among the residents is very low. For a long series of years (1838 to 1862) the average annual death-rate has been only 16 per 1000 for this class. The season lasts from the middle of May until the end of September. Being open to the north and east, the air is very bleak during the late winter and early spring months.

RAMSGATE.—Is much frequented in the summer owing to its gayety, facilities for sea-bathing, &c. It is an excellent residence for delicate children during the months of October and November, when the crowds of visitors have left. The climate is warmer than that of Margate, and more bracing than that of the south coast watering-places. BROADSTAIRS is situated in a pretty little bay about three miles from Ramsgate, and affords a very healthy and quiet sea-bathing place for children. The air is much less bracing than that of Margate.

DOVER.—This sheltered town is generally full in the summer and autumn. As a winter residence it is colder and more exposed to high winds than Hastings, but it is not therefore unsuitable for invalids who can bear a bracing air. In January the weather is often fine and invigorating, but decidedly cold. The easterly winds which prevail during March are very trying. May and June are very agreeable months, as are August and September and October. The climate proves especially serviceable to those subject to strumous affections, chronic bronchitis, dyspepsia, nervous debility, congestion of the liver, &c.

FOLKESTONE.—The beautiful country in the neighborhood, and the fine tonic air of this town, render it a most agreeable residence from the end of May until the beginning of November. Sufferers from dyspepsia, nervous irritability, and overwork will derive most benefit from this climate. SANDGATE, about two miles to the east, offers a milder winter climate, with an exemption from fogs. The mean winter temperature is 41.76°. Consumptive and dyspeptic invalids, who find Brighton too bracing and Hastings too relaxing, may well winter at Sandgate, especially if they need quiet and seclusion.

432. Sussex.

HASTINGS AND ST. LEONARDS.—Situated about midway between Brighton and Dover, the climate of Hastings is very useful for invalids during the winter and spring months. Well sheltered from cold winds, with lofty cliffs and undulating downs, a beautiful and cultivated country, a dry and absorbent soil of clay overlaid

with sand, a pure sea air, and free from all sources of malaria, Hastings can be regarded as offering a healthy sedative climate during six or eight months of the year. The bathing also is good in the summer. The mean annual temperature is 50°; that of winter being 40°, of spring 44°, of summer, 60°, and of autumn 53°. The amount of rain in the year equals about 28.34. South and southwesterly winds are most prevalent during the winter and spring, but unless high they cause very little discomfort. In the neighborhood are various springs impregnated with iron and carbonic acid, but they are not much used.

Hastings is suitable for cases of dyspepsia with loss of tone, chronic bronchitis, neuralgia, chronic rheumatism, gout, and scrofula. For the diseases of childhood it is a good locality. The author has not seen phthisical subjects derive much benefit from it, however; and sometimes he has thought that it seemed to induce hæmoptysis. Dr. Mackness (*Hastings considered as a Resort for Invalids*, London, 1842) has given a table of the causes of death during four years; from which it appears that the total number was 865, of these 254 being from chest affections, and of these latter 161 from consumption,—viz., 91 inhabitants, and 70 visitors.

Although Hastings and St. Leonards now form one town, yet the former is the warmest and most protected, and hence best suited for very delicate invalids. Such as find Brighton agree with them from October until the end of December, may often advantageously spend January and February at St. Leonards.

EASTBOURNE.—Filling, as it were, a chasm between two cliffs, one of which is Beachy Head, this watering-place is rapidly increasing in importance. It is visited in the summer for sea-bathing; but is a good residence for invalids requiring a bracing air from September until the beginning of January. Cases of scrofula, consumption, hydrocephalus, and tabes mesenterica, often derive benefit here. It is also to be recommended in functional disorders of the heart and nervous system.

BRIGHTON.—The climate is bracing and restorative, and is especially beneficial to invalids during the autumn and early months of winter. Although the town is sheltered on the north and northeast by the Southdowns, yet from the beginning of February until nearly the end of May cold north and easterly winds prevail, which prove very irritating even to the healthy. The annual fall of rain is 25.6 inches. The western is milder but more damp than the eastern cliff; but the tonic air of the latter agrees admirably where the circulation is torpid. The Old Steyne offers a climate intermediate between that of the western and eastern cliffs.

Diseases of a nervous hypochondriacal type are much relieved by the invigorating atmosphere of Brighton. Great good is also experienced when the vital powers are sluggish, when there is anæmia, or when disease of the kidneys exists. Strumous children and convalescents from acute disorders may also be sent to this part of the coast. It is unsuitable for individuals of an irritable or plethoric habit; for such as have a dry harsh skin, or any irritating cutaneous disorder; and for those who have a tendency to asthma, inflammatory affections, hæmorrhoids, &c.

WORTHING.—Lying twelve miles west of Brighton and with an aspect almost due south, this town is fully exposed to the sun's rays. It is sheltered from the hot winds of summer and the cold of winter by the Southdown hills, which have an average height of 600 feet. Hence it is warm in winter until the middle of February, and cool in summer; the air being neither too bracing nor too sedative. The mean temperature for the year is about 51°. The rainy days are fewer, and the quantity of rain that falls is less, than at Ventnor or in the West of England. Occasionally, the east and northeast winds render the air very bleak. During summer the fine sands afford excellent bathing.

Worthing can be recommended as a good residence for convalescents; as well as for sufferers from lung diseases, hooping-cough, scrofula, chronic rheumatism, and renal affections.

433. Hampshire.

SOUTHAMPTON.—At the head of the Southampton Water, which stretches from the Solent and Spithead into the interior of Hampshire for some eleven miles, is the clean and handsome town of Southampton. The climate is said to be mild and humid, intermediate in character between that of Devonshire and Hastings. Though sheltered by the high grounds behind it, and by the New Forrest, yet it is unsuited for most invalids, the temperature being variable. The effluvia from the river at low water are often very unpleasant.

A short distance from Southampton Water is NETLEY. Here has been built the Royal Victoria Hospital; which is especially intended for the reception of invalid soldiers from foreign stations, and which has become the headquarters of the Army Medical School. The site seems to have been well chosen; while in most respects the arrangements of the building are excellent.

BOURNEMOUTH.—This favorite watering-place, situated within a fine bay, is about ten miles from the western extremity of the Isle of Wight. It is well screened by hills and pine woods from the north and northeast winds, but is exposed to the south-westerly gales. Owing to the nature of the soil, outdoor exercise is practicable immediately after rain; while there are great facilities for easy walking. The mean annual temperature is 51.00°; that of winter being 42.38°, spring, 49.11°, summer 60.18°, and autumn, 51.71°.

It may be recommended as a quiet, healthy resort, during the winter, for such invalids as are not affected by moderate variations of temperature, for those who are weak without having actual organic disease, and for persons returning from tropical countries. The climate is mild, but not relaxing. During the spring and early summer months, thick fogs and cold easterly winds are rather prevalent. In summer there is good sea-bathing, but the heat, and clouds of fine sand which rise when there is any wind, render Bournemouth unpleasant to many at this season.

434. Isle of Wight.

RYDE.—The towns on the north side of the island—Ryde and Cowes—are more suitable for summer visitors requiring change of air and of occupation than for invalids needing a dry atmosphere and repose. The air is mild. Although the attractions of both localities are great, yet in neither is the bathing good.

THE UNDERCLIFF.—This is the best part of the island for a winter and spring residence. The Undercliff extends from the village of Bonchurch to Black Gang Chine, a distance of six miles along the southeast coast. The scenery is romantic. sea fogs are rare except towards the end of May and during June, and both soil and atmosphere are dry; while it is well protected, by a range of lofty chalk and sandstone hills, from the north, northeast, northwest, and west winds. It is raised some fifty or seventy feet above the level of the beach, and may therefore be represented, in the words of Sir James Clark, "as a lofty natural terrace, backed by a mountainous wall on the north, and open on the south to the full influence of the sun from his rising to his going down, during that season at least when his influence is most wanted in a northern climate."—The mean annual temperature is 51.35°; that of winter being 41.89°, spring, 49.66°, summer, 60.63°, and autumn, 53.58°. The mean annual fall of rain is 23.48 inches, whereas at Newport, in the centre of the island, it is 33.60.—The best season is from the beginning of November until the end of May: between August and October it is too relaxing and humid.

The Undercliff, of which VENTNOR is the chief town, may be resorted to by all those who need a genial and agreeable winter and spring climate. It allows the phthisical invalid to re-oxygenate his frame by almost daily exercise in the open air, at a season when he would be unable to do so at most other parts of England. The walks are fine and sheltered. The air is mild and yet of a bracing tonic character: and hence it differs from that of *Torquay*, which is of a more moist and relaxing nature. Patients with laryngeal and bronchial affections, hepatic and renal disease, atonic and nervous dyspepsia, and children with glandular swellings or strumous ulcers, do very well at this part of the island.

As a summer resort, SANDOWN can be strongly recommended; its beautiful bay and open sea, its fine sands, its good bathing, its dry sandy soil, its good drainage, and its pure and abundant water-supply being so many strong recommendations. For some few cases of disease not requiring a mild climate, Sandown may prove serviceable in the winter. The air is bracing as compared with that of Ventnor and Shanklin. The invalid can readily change from one of these spots to the other, if necessary.

435. Dorsetshire.

POOLE.—Standing on a peninsula, this old-fashioned town is an agreeable place for such as have to be driven from books and business to quiet and idleness. Owing to geographical peculiarities in its position, the tides in Poole harbor ebb and flow twice in the twelve hours.

WEYMOUTH.—This town, with the adjacent MELCOMBE REGIS, is a favorite summer resort; the beautiful bay of the latter, with its fine sands, being well adapted for bathing. In the autumn and winter the temperature is equable; whilst the air is so pure that it is suitable for invalids from various diseases. Indeed, so healthy is the climate supposed to be, that Dr. Arbuthnot is reported to have jocosely said,—"A physician could neither live nor die at Weymouth." As it is the nearest English port to Guernsey, seventy miles distant, it forms a station of the mailboats.

436. Devonshire and Cornwall.

BUDLEIGH SALTERTON.—A quiet retired village, nearly five miles to the east of EXMOUTH, in a small open valley on the seashore. For invalids who can climb the neighboring hills, it offers a mild and protected winter residence.

DAWLISH.—Resorted to in summer for bathing, Dawlish may be recommended as a winter resort for those needing a mild air. It is more humid than Torquay. Protected from northerly and southwesterly gales, it is still unfavorable in the spring, owing to the biting east wind which finds access to the picturesque valley, on either side of which this small town is placed.

EXMOUTH.—The new portion of this town stands high, and is much exposed to wind from every quarter. The old part lies along the margin of the river and the base of Beacon Hill, and is damp, though it has the advantage of being protected from southwesterly and northerly gales. Invalids who require a bracing air may be benefited here, but the cold variable weather in winter makes it unsuitable for those with pulmonary complaints.

SALCOMBE.—Well sheltered, this is said to be the warmest spot on the southwest coast. For such as seek a mild and equable winter temperature, this small spot would be useful, were it not for the want of convenient ground for exercise.

SIDMOUTH.—Recommended in summer and autumn for its bathing, Sidmouth is also a good situation for invalids requiring a mild relaxing air during winter. The mean annual temperature is 50.2°; that of winter being 41.9°, of spring, 47.5°, of summer, 59.9°, and of autumn, 51.6°.—The annual average rainfall is 27.9 inches, the average number of days on which rain falls in the year being 141. During the years 1865 and 1866 the returns show a much increased rainfall. The soil of the town is gravel or red sandstone: the ground dries quickly after rain, so that the invalid can usually walk out on the Esplanade within half an hour of a heavy shower. The water-supply is good.

TEIGNMOUTH.—The mean winter temperature is six degrees higher than that of London, while that of summer is five degrees lower. On account of its exposed position it is not suitable as a winter home for the sick.

TORQUAY.—The climate of this favorite locality, while mild and equable, is less humid than that of many other places on the southwest coast. It has a southern aspect, and is sheltered on all other sides by heights. Mean annual temperature, 52.1°; the average for the winter being 44.0°, spring, 50.0°, summer, 61.2°, and for the autumn, 53.1°. The average annual amount of rain is 35.20 inches, and it falls on about 175 days in the year. The season is from September to May, and though it is not absolutely necessary for the invalid to leave during summer, yet it will be better for him to do so. November is generally very fine, being bright and sunny.

Torquay is useful in many cases of phthisis, chronic bronchitis, laryngeal affections, and rheumatism. In heart disease, when this organ is oppressed without much lowering of the vital powers; in inflammatory dyspepsia, with an overirritable condition of the mucous membranes generally; and for invalids returning from tropical climates,—this town may be recommended.

The climate has a soothing influence upon the organs of respiration; but the effect upon the nervous, digestive, and muscular systems varies according to the situation which the invalid adopts for his residence. Dr. Radclyffe Hall recommends a feverish excitable consumptive patient to lodge in a sheltered part close to the sea, provided sea air does not disagree. When the feverishness is less marked, and there is danger from a sinking of the powers of life, a situation part way up the hills suits better; or the beautiful district of MEADFOOT, protected from the east and northeast by an extensive range of cliff, may be selected, if close proximity to the sea be de-

sirable. After a residence at the sea-level for a time, removal to the houses on the southern faces of the hills often proves useful.

ILFRACOMBE.—The fine and bold scenery of this town has attracted the attention of tourists during late years. Situated on the southern shore of the Bristol Channel, surrounded on three sides by the sea, Ilfracombe can be recommended to invalids who require a bracing air. The summers are comparatively cool; while the winters are warm and dry, but invigorating. Convalescents from tropical disease often derive great good from wintering at Ilfracombe.

EXETER.—This fine old city, though standing upon elevated ground, is sheltered. Except during July and August (when it is close and relaxing) it offers an advantageous residence for invalids requiring a residence away from the sea. Its mean temperature in winter is 41.4°, spring, 49.5°, summer, 62.0°, and autumn, 51.9°. The average number of days on which rain falls in the year is 162, the annual amount being 31.90 inches.

Other neighboring inland towns of Devonshire are agreeable and healthy.—KINGSBRIDGE, TOTNES, NEWTON ABBOTT, TIVERTON, CREDITON, CULLOMPTON, OTTERY, HONITON, &c. Of the moor towns, it need only be said the air is moist and misty. DARTMOOR is bleak and chilly, the mornings and evenings even of summer being cold.

PENZANCE.—This seaport, on the northwest side of Mount's Bay in Cornwall, is about ten miles from the Land's End. The climate is mild but relaxing. It has a mean annual temperature of 51.8°; the mean for the winter being 44.0°, for the spring 49.6°, for the summer 60.2°, and for the autumn 53.3°. As a winter residence for invalids it possesses the twofold advantage of warmth and great steadiness of temperature during the day and night. The disadvantages are that it is much exposed to wind and storm, and that it is humid—the annual rainfall being 44.6 inches. It should be avoided in the spring.

Penzance may be useful in chronic bronchitis, in the earliest stage of consumption if there is a dry, harsh cough, with scanty expectoration, and in the case of aged invalids who derive benefit from a warm moist atmosphere. It is injurious in phthisis with relaxation of the mucous membranes and copious secretion, in cases of hemorrhage, in atonic dyspepsia, and in debility of a low nervous type.

LAND'S END.—The climate somewhat resembles that of South Devon, but as regards humidity and exposure to winds it is inferior to it. Invalids should not remain in this district during the winter and spring.

437. Gloucestershire and Worcestershire.

BRISTOL.—This city, situated chiefly in Gloucestershire but partly in Somersetshire, has nothing to recommend it to an invalid. A few years since a gentleman, who assured the author that he always suffered either from gout or asthma, remarked that in Bristol he was generally afflicted with the former, but never with the latter; though directly he left this spot his breathing became impeded. Of the two evils he preferred a smoky city with gout to pure country air and asthma.

CLIFTON.—Clifton is built on the sides and summit of a precipitous limestone hill, about one mile west of Bristol. In former days invalids resorted to this spot on account of its hot well; now it is in repute for its mild winter climate. The mean temperature for the year is 51.26°; that for the winter being 39.91°, spring, 49.79°, summer, 63.87°, and autumn, 51.49°. The annual rainfall is 32.56 inches; and the number of rainy days about 169. The lower part of the town is much milder and more humid than the upper; and hence while preferable during winter for many cases, is too relaxing in the summer. The loftier situations (such as York Crescent, with its southern aspect and sheltered sunny promenade) are beautifully situated and well adapted for invalids during the summer and autumn months.

The Hot Well lies at the foot of St. Vincent's Rock. It yields an abundant supply of water at about 75° Fahr., containing small quantities of magnesia and lime, with an unusual amount of carbonic acid gas. Owing to the latter, it might perhaps be advantageously taken in dyspepsia with irritability of the gastric mucous membrane; but it is very rarely, if ever, employed medicinally.

MALVERN.—Perhaps there are few more healthy and pleasant spots in the kingdom for a summer residence than this. Built on the declivity of the Malvern hills, situated eight miles S.S.W. of Worcester, the scenery is all that can delight the

convalescent, or the man who is broken down from overwork. The air is pure and invigorating, and is well adapted for bracing the system of such invalids as can bear an elevated site. Owing to the eastern aspect of the village, the strong winds of the winter and spring are severely felt.

There are two springs in the neighborhood which may be frequented for amusement. But the waters of St. Anne's Well and of the Holy Well are only pure and soft; the very small quantities of muriate of lime, sulphate of soda, and carbonate of lime which they contain being useless in a medical point of view.

438. Lancashire and Yorkshire.

SOUTHPORT.—Situated on the west coast of Lancashire, between the mouths of the Mersey and the Ribble, this watering-place is eighteen miles from Liverpool and thirty-two from Manchester. The climate is bracing and sedative, the air dry but not irritating, fogs are very rare, and the atmosphere is light and pure. The temperature is variable, changes occur rapidly, while the mean for the year is 54°. The sea-bathing is good at low water, the shore sandy, the water clear and pure, and the bay so well sheltered that it is seldom too rough.

As a summer and autumnal residence, Southport is useful in laryngeal, bronchial, and pulmonary affections; in tuberculosis; in dyspepsia with constipation and flatulence; in chronic rheumatism; in some forms of paralysis; and in nervous depression after long illness.

SCARBOROUGH.—Built on the slopes of a beautiful bay on the Yorkshire coast, in the form of an amphitheatre, this town is resorted to in the summer for its sea-bathing. The season extends from June to October. It is suitable for nervous and hypochondriacal patients, for such as have been overworked and need change of scene and amusement, and for convalescents requiring a bracing air.

A short distance from the town are two mineral wells,—the *North* or *chalybeate*, and the *South* or *saline* spring. There is not much difference, however, between their waters; those of both being aperient, alterative, and slightly tonic. Their temperature is about 49°, and they yield nitrogen gas, carbonate of iron, chloride of sodium, sulphate of magnesia (most abundant in the South spring), sulphate of lime, and bicarbonate of lime. These waters may perhaps be useful in habitual constipation, torpidity of the liver, and scrofulous complaints.

FILEY, eight or nine miles to the south of Scarborough, has most of the advantages of the latter, with the additional one for the invalid of quiet and retirement. It has also a saline chalybeate spring.

WHITBY.—The air of this seaport town is bracing and pure, the sands are extensive and afford good bathing, while there is a chalybeate spring which is thought well of for its mild tonic properties. The country round Whitby offers beautiful rides and walks. As at Filey, the season extends from the beginning of June until the end of September.

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439. Wales.

LLANDUDNO.—Situated in Caernarvonshire, in the most attractive part of North Wales, this watering-place has risen rapidly into favor during the last few years. It is often called the Welsh Brighton. The town lies between two bays,—Conway and Llandudno. It is sheltered from the N. W. and E. by the Great and Little Orme's Head, huge masses of limestone rock which rise precipitously from the sea for many hundred feet. In summer the invalid will find a residence on the flat facing Llandudno Bay most suitable. The beach is of sand; the bathing is good. For winter, the houses under the cliffs are to be chosen, owing to their sheltered position. The winter climate is comparatively mild.

The geologist will find beautiful and delicate fossils on the Orme's Head (Encrinites of many species, Brachiopodous and Lamellibranchiate shells, as well as several species of Gasteropoda); while the botanist will be delighted with the many uncommon plants to be seen in the neighborhood. Only four miles distant is Conway, with its most picturesque castle.

TENBY.—This is the most fashionable bathing-place in South Wales Placed on the Pembrokshire shore of Caermarthen Bay, the scenery of the neighboring country is attractive and beautiful. The sands are smooth and good. The season lasts from June until the end of October. Invalids, however, can often stay with advantage during the winter; the atmosphere being then usually mild and springlike, while accommodation can be obtained at moderate prices. There are not many days during the winter months when the invalid will be unable to take exercise in the open air.

The number and beauty of the Actiniæ and other zoophytes to be found at Tenby have been made known to all lovers of natural history by Mr. Gosse. There are few places which can compare with it for the seaside naturalist. Moreover, the botanist, geologist, and antiquarian, will all find occupation in their favorite studies.

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440. Ireland.

KINGSTOWN.—This is one of the best frequented sea-bathing places in Ireland. Situated about seven miles southeast of Dublin, on the southern shore of the bay, the harbor is said to be one of the most splendid artificial ports in the United Kingdom. There are good walks in the surrounding country.

The sharp and bracing air of Kingstown proves injurious, during the latter part of the winter and the early spring months, to patients with disease of the lungs.

HOLYWOOD.—A small watering-place much used by the residents of Belfast, from which city it is about five miles distant. The beach is sandy, and good for bathing. There are chalybeate springs in the vicinity.

QUEENSTOWN (Cove).—A town which consists of a series of terraces, built on the southern acclivity of Cove Island, in Cork harbor. It is well sheltered from northerly winds; is exposed to the full influence of the sun; and the winter climate is admirable, being mild and equable. The mean temperature for the year is 51.9°; that for the winter being 44.1°, spring 50.1°, summer 61.3°, and autumn 52.0°. The annual rainfall is 33.25 inches; the average number of days on which there is wet being 131. The invalid should settle here about the end of October; and he will scarcely have a day during the ensuing four or five months when he will be unable to take exercise in the open air. Owing to the way in which the houses are built at a variety of elevations, the exact locality chosen must depend upon the patient's malady and strength.

All diseases needing a sedative and slightly humid atmosphere may derive benefit at Queenstown. Laryngeal, bronchial, and pulmonary complaints are especially relieved by a winter residence here; and so also are dyspeptic, strumous, rheumatic, and cutaneous affections. It is admirably suited for delicate children; and for convalescents from hooping-cough, eruptive fevers, &c. Functional disorders of the uterine system are often cured by it. In the summer there is excellent sea-bathing. PASSAGE and MONKSTOWN are very healthy villages, situated on the river, about halfway between Queenstown and the city of Cork.

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441. Scotland.

The climate of Scotland is remarkably equable throughout the year; the summer heat and winter cold being mitigated by the ocean winds. The mean temperature for the year is about 47°; that for the northern counties being higher than for the eastern. The prevailing winds are from a westerly quarter; blowing, for more than two-thirds of the year from between the southwest and northwest points. In spring and early summer cold east winds prevail. The atmosphere is moist, nearly 100 inches of rain falling annually in some of the mountainous parts; though along the southern shores of the Firth of Forth the amount is under 30, at Glasgow about 29, and at Musselburgh not more than 24 inches.

The air of EDINBURGH, though neither genial nor mild, is yet salubrious; and

is said to be favorable to longevity, as well as to the development of the mental and physical powers. The city extends northwards to the shores of the Firth of Forth; Granton and the old fishing village of Newhaven being only separated from the town by a pleasant walk. The elevated situation of the city renders it exposed to violent winds; but the effect of these is favorable, at all events to the inhabitants of the Old Town, by driving away many impurities. As a place of education for youths needing a bracing climate Edinburgh has great advantages.

The old city of ST. ANDREWS, situated on a rocky promontory some fifty feet above the level of the sea, has a wholesome genial climate. It should be avoided in the spring months, as it is then visited by a disagreeable chilly mist from the northeast; but from July until the end of October the air is pleasant and salubrious. Sufferers from rheumatism, or invalids with weak lungs, had better not remain long in this city. The rate of mortality among the residents is somewhat high.

On the western coast there are several localities which seem to possess good winter climates for individuals. The Island of Bute, in the Firth of Clyde, has many advantages; the air being mild and equable, though rather humid. Its mean temperature for the year is 48.25°; that for winter being 39.62°, spring 46.66°, summer 58.06°, and autumn 48.59°. The annual rainfall is 88.62 inches; there being more or less wet on about 150 days. Snow rarely falls in the winter, and there is a freedom from fogs. The island is protected from the east winds of spring; and there are great opportunities for outdoor exercise. The climate being rather sedative, invalids needing a strong bracing air must seek it elsewhere.

Hypochondriacs, sufferers from habitual constipation or sluggish action of the liver, and young men with a predisposition to phthisis, are often much benefited by a summer or autumnal walk through the HIGHLANDS; and certainly for the overworked literary or professional laborer nothing can be more invigorating than such a tour. "I verily believe that I should die," said Sir Walter Scott, "if I did not see the heather every year."

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442. The Channel Islands.

All the Channel Islands are remarkable for their beautiful and varied scenery, for the temptations they offer to the zoologist and botanist, the mildness and humidity of their climates, the absence of great heat in summer and great cold in winter, and for the equability and duration of autumn. The east, northeast, and north winds, which prevail in the spring, are disagreeable and injurious.

The climate of the Channel Islands is generally favorable in chronic disease, in asthma, in bronchial and intestinal disorders, and in affections of the urinary organs; while it is also suitable for convalescents from acute inflammations of the organs of respiration. The old and the young also are benefited by it: to them the effect is tonic and regenerating. Invalids from India and Australia may winter in these islands with advantage. They are unfavorable in chronic rheumatism, hepatic disorders, structural diseases of the uterus or ovaries, nervous dyspepsia, hypochondriasis, and in cases where there is a tendency to dropsy or hemorrhage. Pulmonary consumption appears to be as common and fatal among the inhabitants as in most other localities. The most favorable time for a stay in either of the group is from August until the beginning of February. In some instances, a change, for a time, from one island to another, is productive of good.

These islands may be reached by steamers from Southampton or Weymouth in less than twelve hours. Invalids, especially ladies and children, should choose their day of sailing so as to avoid a rough passage across the English Channel; and so that they may not have to land in small boats. The packets can generally enter the harbor of St. Peter's Port in Guernsey, and that of St. Helier's in Jersey, except near low water on a receding tide.

GUERNSEY, the most westerly and exposed of the islands, has an average annual temperature of 51.50°; that for winter being 44.2, spring 47.7°, summer 59.9°, and autumn 53.8°. Sea fogs are rare, except in the early part of the day in spring and autumn. The air is relaxing. The mean annual rainfall is rather more than 35 inches, falling in heavy showers on about 164 days, and more often by night than day. Percolation takes place rapidly through the gravelly soil: evaporation is also

favored by the brisk wind and sunshine. The walks are too hilly for most invalids. Guernsey is thirty miles from Jersey.

JERSEY is the largest of the group of islands, and the most important; being about twelve miles long, with an average breadth of five miles. The surface of hill and dale is well wooded; the coast is rocky and precipitous; and it is exposed to the wind from every quarter. The mean yearly temperature is the same as for Guernsey; during three-quarters of the year the average being higher, while it is lower in the winter. Nevertheless the latter is mild, frost and snow being very rare. The daily range of the thermometer is small, though it is greater than in Guernsey. St. Helier's contains nearly half of the population of the island; but it is more foggy and humid, and therefore less suited for invalids than St. Aubin's, which lies three miles to the southwest of it. The sands are good for summer bathing.

The air of ALDERNEY and SARK is usually said to be drier and more bracing than that of Guernsey; while that of the latter is less relaxing than that of Jersey.

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443. South of France.

PAU.—This, the chief town of the department of the Basses Pyrénées, is about 125 miles south of Bordeaux and 56 miles east of Bayonne. It may be reached from London in 48 hours; and the season lasts from the beginning of November until the end of May. The mean annual temperature is about 56°. The average for September, October, and November, is 56.4°; that for December, January, and February, 42.8°; while for March, April, and May, it is 54.0°. The annual rainfall is about 43 inches, the rainy days numbering 119. Owing to the gravelly soil any quantity of moisture is readily absorbed. Dr. Playfair, quoted by Sir James Clark, sums up the nature of the climate, thus: "Calmness, moderate cold, bright sunshine of considerable power, a dry state of atmosphere and of the soil, and rains of short duration. Against these must be placed,—changeableness, the fine weather being as short-lived as the bad, rapid variations of temperature, within moderate limits. In autumn and spring there are heavy rains." The air in December, January, and February, is dry, and out of the sun, cold; but even in these months the rays of the latter are so powerful that the pedestrian ought to protect his head with an umbrella. There are very few days on which the invalid will be unable to take exercise between 12 and 3 o'clock. The evenings, however, are chilly, and the nights cold.

Pau is not influenced by the west-northwest wind, the *Circius* of the ancients; nor by the north wind or *Bise*, which produces a biting cold; nor by the northwest wind or *Mistral;* in fact the climate is calm and soothing, high winds being rare. According to some physicians Pau is useful in cases with a scrofulous taint, in preventing generation of tubercle, and in checking softening of tubercle when formed. Dr. Taylor states, that the predisposition to disease favorably influenced by this town, may be summed up in one general principle, viz., wherever it depends upon increased nervous and arterial action, permanently produced, either by temperament or by some cause leading to more active disease.

The climate is sedative (not to say depressing), modifying nervous and vascular irritation; and therefore beneficial in irritations of the mucous membranes of the air-passages or alimentary canal. It is unsuitable where the powers of life are declining; in chronic catarrh or bronchitis of old people, with loss of tone and excessive expectoration; in chronic rheumatism or gout, with debility of digestive organs; in tendency to apoplexy from passive congestion; in chlorosis; and in disorders attended with congestion of the venous system and diminished nervous energy. In all these cases the climate of Mentone (from the commencement of November until the end of February) is the remedy. In short, Pau is to be chosen when there is "functional derangement of a tonic irritable type, which paves the way to organic mischief." Acting on persons in health the air lowers the tone; makes the sanguine, phlegmatic; and the choleric, melancholic.

BIARRITZ.—A fashionable sea-bathing village on the shores of the Bay of Biscay, some 5 miles southwest of Bayonne, and 65 miles from Pau. The roads between the two places are excellent, and communication by diligence or omnibus very easy.

It can be reached from London in about 48 hours. The air is warm; the temperature of the sea high; and there is always a soft invigorating sea-breeze. When benefit has been derived from a winter at Pau, it is often advisable for the patient to go to Biarritz for the summer; returning to Pau for a second winter. The sandy gently shelving beach is well adapted for bathing, which is no slight luxury in water at a temperature of 75° Fahr.

According to Dr. Henry Bennett, the climate not only renders Biarritz a favorite summer and autumn watering-place, but puts it among the eligible winter stations of the south. It is cheaper also in winter than summer, being then almost deserted by fashionable visitors. In cases of severe disease it is not equal to Pau, Ajaccio, or Mentone, the winter breezes from the Bay of Biscay being often very violent.

MONTPELLIER.—The reputation which this city formerly enjoyed as a winter residence for consumptive patients has entirely gone. The climate is dry, irritating, and changeable; and though the heat of the sun is great, yet the winter winds are cold and unbearable. Mean temperature of the year 59.5°; winter 44.2°, and summer 76°. Phthisis is very prevalent amongst the native population. Invalids with relaxed mucous membranes and copious secretion, sometimes find advantage from spending the autumn here.

MARSEILLES.—This city, second only in importance to Paris, offers no residence for the invalid. Pulmonary consumption annually destroys a large number of young women and men. Catarrhs, pleurisy, and pneumonia are common; and so are cutaneous affections, diseases of the generative organs, and cancer.

Mean annual temperature 58.82°; winter 45.22°, spring 55.91°, summer 72.93°, and autumn 59.21°. Although these figures are high, yet the winter is sharp and cold, the winds being high and prevalent—especially the mistral (northwest). In spring, the variations in temperature are sudden and dangerous, and there is much rain. During summer the heat and dust and insects are intolerable.

HYERES.—This little town is agreeably situated about two miles from the shores of the Mediterranean, and an hour and a half's drive from Toulon. The climate is clear, pure, dry, and tolerably mild. The greater portion of the town is sheltered from north and east winds; while it is open to the south, benefiting by the influence of the sun and sea-breezes. But it is exposed to the mistral, as there are no protecting hills on the northwest: and this blows frequently during the first three months of the year. It has been thought one of the best localities in the South of France for the winter abode of invalids with pulmonary disease: as there is much fine weather, without great variations in temperature. The mornings and evenings, however, are cold; and hence, remembering too the prevalent winds, it should not be recommended. In summer the heat and dust prove very annoying. The best season is during April and May, or from the beginning of September to the end of November.

CANNES.—An agreeable seaport, on the shore of a small bay, well protected from cold winds. It has a climate more moist and sedative than Nice, and less so than Pau. The lower parts of the town should be avoided, as the drainage is bad. The overworked man of business, seeking fresh air, genial sunshine, and a locality possessing a combination of fine sea and mountainous scenery, may advantageously winter here. Cases of nervous dyspepsia are particularly benefited, and so are some forms of phthisis.

In the summer, Cannes is resorted to for sea-bathing, the extensive sands being well adapted for this purpose. Sand-baths are sometimes used for the relief of rheumatic and paralytic affections of the limbs; the patients being immersed up to the chest in sand warmed by the sun. Like mud-baths they may serve to amuse the invalid, while he is breathing pure air and living by rule.

NICE.—The reputation long enjoyed by Nice for salubrity, has been found to have been greatly overrated. Protected towards the interior by the Maritime Alps and the Estrelles, cooled by the breezes of the Mediterranean, and with a mild dry climate, it would seem to be a favorable locality for phthisical patients. But notwithstanding these advantages the valley is exposed, during winter and spring, to cold irritating winds from the east and northeast; and the Nisands then suffer much from catarrh, ophthalmia, skin eruptions, pneumonia, and irritable gastric affections. The mean temperature for the year is 59.01°; for winter, 46.33°; spring, 55.92°; summer, 71.83°, and autumn, 61.52°. The variations between the warmth

of night and day, of sun and shade, are remarkable. The annual rainfall is about 26 inches; most falling in October and November, leaving the other winter and spring months comparatively dry.

M. Carrière has compared the valley in which Nice is situated to an open fan, the arch of which is formed by the mountains, and the point by the shore, where the Var discharges itself into the sea. But the mountainous semicircle is indented in parts, and down these interruptions the winds blow from certain points and injuriously affect consumptives. The mistral is "the scourge of the Mediterranean shores of France and Sardinia." It may continue one, three, seven or more days at a time: in autumn and winter it blows frequently, and hence it is absurd for invalids requiring a mild temperature and calm atmosphere to winter at Nice. The southeast wind, or sirocco, so injurious on the continent of Italy, becomes changed into a mild beneficial breeze during its transit across the Mediterranean to Nice; and hence it modifies winter cold, and summer heat and dryness. *Le Croix de Marbre*, the suburb of Nice inhabited by the English, is most unfavorable for pulmonary invalids: being exposed to the libeccio (a relaxing southeast wind), and to the blighting influence of the mistral. The invalid, if he will go to Nice, should live at the foot of the heights, in one of the shady valleys open to the south. The brilliant sun entices him out of doors, and then the blighting piercing wind attacks him, and clings around him; no furs, no heavy cloaks, no flannel will keep out the cold. He ought not to venture into the open air too early in the day, nor should he remain there later than one hour before sunset. The bills of mortality of the Nisards give one-seventh of the deaths as from phthisis. That "Nice is one of the last places to which a foreigner laboring under tubercular phthisis should resort," is the opinion of Dr. Burgess. It is also unfavorable for nervous and susceptible invalids. The air may sometimes be beneficial in chronic rheumatism and gout; in all uterine derangements connected with a relaxed and torpid state of the system; for delicate children of a strumous habit; and for invalids returning from tropical climates. The stay should extend from the middle of October until the beginning or middle of January; for although the season lasts until the end of April, yet the invalid will seldom derive benefit from prolonging his residence beyond January. The author has been told that there are well-conducted Pensions both at Nice and Cannes which are preferable to the hotels as being more quiet and homelike.

VILLA FRANCA.—This little town, a short distance from Nice, has a climate somewhat warmer and drier, and is less exposed to the north and northwest winds. The vegetation is luxuriant and early.

MENTONE.—Lately a small Italian town, but annexed to France in 1860, Mentone offers one of the most sheltered stations in the south of Europe. It is situated on the northern shore of the Mediterranean, at the foot of the Maritime Alps, and twelve or thirteen miles to the east of Nice on the road to Genoa. The bay, in the centre of which the town is placed, is completely protected from the north, northwest or mistral, and northeast winds, by the mountains, while, owing to the absence of fogs, the paucity of rain, and the great power of the sun, the air is very pleasant during the winter months. The mean temperature is a little higher than that of Nice. The night temperature is also mild and not subject to great variations, so that many invalids are able to keep the air of their bedrooms pure by sleeping with the windows slightly open.

From the beginning of November until the end of April, the climate is genial and bracing The invalid must not remain during the summer. A residence here is very useful in phthisis, when the disease has not passed beyond the first stage, and even when it has reached the second or third, provided the tubercular deposit be limited to a part of one lung. It is also beneficial in chronic cases of consumption, chronic bronchitis, and chronic gout and rheumatism. Strumous children improve remarkably. Some who visit Mentone prefer the eastern bay, some the western, but, whichever be chosen, care must be taken to select rooms having a south aspect, and with the bedroom not on the ground-floor. According to Dr. Henry Bennet, pulmonary consumption is a rare malady among the native population, the deaths from it being only 1 in 55, instead of 1 in 5, as in London and Paris.

For the sake of those who are not overburdened with wealth, it may be as well to remember that Nice and Mentone are both extravagant places, while *San Remo* is much cheaper, and the air just as good during the winter. Moreover, twelve miles east of Mentone, and seven miles west of San Remo lies *Bordighera*. It faces the south in a fine bay protected from the due east and west winds by ranges of hills.

The air is mild and exhilarating. The walks are good, being well protected from dust and wind. The palm, olive, orange, and lemon, all flourish on the hills nearest the town. And lastly, the pleasure of staying at San Remo or at Bordighera will be enhanced by reading a very charming tale—Doctor Antonio.

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444. Corsica.

This island, one of the most important in the Mediterraneun, has shores mostly low, while the centre is mountainous. Corsica is healthier than the Riviera, and its air is more genial. The olive is indigenous. The scenery is grand. Within a few hours' drive of AJACCIO are several villages in the hills (*Orezza* with chalybeate springs, *Guagno* with sulphur springs, &c.), where invalids might reside during the summer after having wintered in Ajaccio. This clean and cheerful little town, on the west coast, is said to be especially charming during the months of January and February. The gulf of Ajaccio offers an excellent harbor for yachts, while it is protected from all winds but the southwest by its hemicircle of grand mountains in the distance. The sandy shore, with beautiful rocks, is greatly to be preferred to the shingly beach at Nice. The climate is as warm as that of Nice (from which it is distant some eight or nine hours' sail by the mail steamer), and it is unexceptionally healthy. The air of Ajaccio is more soothing (less stimulating) than that of Mentone, without being relaxing like that of Madeira. Napoleon Bonaparte was born at Ajaccio on August 15th, 1769.

Ajaccio is the only locality in Corsica that appears thoroughly eligible as a winter residence. The climate of BASTIA is warm and agreeable, but the town has a small tideless port, and is exposed both to southeast and northeast winds. Dr. Manfredi, the surgeon of the civil hospital at Bastia, states that nearly all surgical wounds heal at once by first intention, while purulent absorption is almost unknown. Intermittent fever at times prevails in parts of Corsica towards the end of summer or beginning of autumn, but it is only met with about some marshy districts, chiefly situated on the eastern coast.

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445. Spain and Portugal.

ALICANTE.—Lying along the shores of a bright open bay in the Mediterranean, is this healthy town. It is sheltered on the north and northwest sides by a limestone rock some 700 feet high, is free from malaria, and has a mild dry air, with comparative immunity from high winds. The mean annual temperature is 63.7°, that for winter being 52.1°. The rainfall is very moderate. In summer, the calm open sea and sandy beach afford good bathing. In winter, whatever may be the temperature of the morning air, the middle and after part of the day will generally be mild and calm.

As a winter residence, it may be recommended to such as need a dry and somewhat stimulating climate. It has been found useful in chronic bronchitis, with excessive secretion, as well as in atonic dyspepsia.

BARCELONA.—This, the chief city of Catalonia and the second in importance of Spain, has a mild winter air. It is open to the sea on the south and southwest, and is partially protected from westerly and northerly winds by the hills at the back. The mean annual temperature is 63.14°, that of winter being 50.18°, while there is rain on some 69 days in the year. Invalids requiring a rather stimulating and dry climate may reside here, but it cannot be strongly recommended. April and May are the most uncertain months.

CADIZ.—The semi-insular position of this commercial town, on the shores of the Atlantic, would seem to point it out as a suitable winter residence for those requiring sea-air. The climate is soft, humid, and relaxing; the winters are mild and the

summer temperate; the weather is showery, especially in winter and autumn, but the soil being porous it soon dries, and there are few days during winter on which exercise cannot be taken in the open air. The mean annual temperature is 62.75°, that for winter being 52.80°, though very often at this season the thermometer, in the shade, will stand at above 60°. Rain falls on about 100 days in the year, but it generally comes in showers, with intervals of sunshine.

This town may be recommended for some irritable affections of the chest and in certain cases of heart disease. Women with any tendency to ovarian or uterine disorders should avoid Cadiz. The stranger will find it best to reside in the central portion of the town, as on the sunny side of the square of General Mina or San Antonio, or in one of the lesser plazas. The wall (Muralla del Mar) which nearly surrounds the town, has on its summit an agreeable walk.

MADRID.—The capital of Spain, situated nearly in the centre of the Peninsula, is perhaps an attractive city for the tourist; but the irritating and stimulating character of the climate renders it an unfavorable one for the English invalid. The mean annual temperature is 57°; but the range is so great that Dr. Francis has observed a thermometer pointing to below freezing a little after sunrise, stand at 100° at 3 o'clock, P M. The winters are raw and long, with hard frosts and piercing cold winds: in summer the heat is irritating and oppressive, so that even the Spaniards cannot stand it. "The subtle air," says Ford, in his Handbook, "which will not extinguish a candle, puts out a man's life. . . . . No wonder, according to Salas, that even the healthy of those born there live on physic."

MALAGA.—Dr. Francis speaks very highly of *Malaga*, which indeed, seems to be the El Dorado of cities; for he asserts that there is no place in Spain, nor in the whole of Europe, as far as our present information goes, that possesses a climate at once so mild and equable, with so little variation from day to day. This seaport city is situated on the shores of a bay of the Mediterranean 65 miles east-northeast from Gibraltar. The mean annual temperature is 66.11°, that of winter being 54.41°; the heat of January corresponding with that of May in London. The air is neither too moist, nor too dry; and a lofty mountain range forms a protecting background to the winter winds. The annual rainfall is said to be only 16½ inches.

The longevity of the people is remarkable; persons aged from 80 to 90 being seen going about the streets in full possession of all their faculties. Though the ratio of mortality is 1 in 37, yet it must be remembered that this is larger than it would otherwise be, not only from the excessive mortality in early life (42.3 per cent. during the first five years) owing to the mothers not nursing their infants, but likewise from the presence in the town of a large garrison and a crowded convict establishment. The principal drawback seems to be the terral, a cold harsh wind from the northwest, which occasionally blows during the winter with great force. It causes restlessness, and oppression at the chest, where there is any pulmonary affection. The air is also unfavorable in cases of disease of the nervous centres.

The invalid who requires a warm, dry, and gently tonic climate, with constant sunshine, may well visit Malaga for the winter. A residence here is especially useful when phthisis seems to threaten, or even when it is present in an early stage. He should live in the newer part of the town, where the soil is sandy, and through the centre of which runs the Alameda, a fine broad promenade bordered by cheerful well-ventilated houses. The Spanish custom of taking a siesta in the middle of the day ought to be adopted. There is regular steam communication with Liverpool, the voyage lasting seven or eight days.

VALENCIA.—This city, built upon the great plain of Valencia, is about three miles from the sea. It may be reached in seven days from England, by way of Marseilles. The town is very clean, the climate unusually dry, though the water evaporated by the system of irrigation pursued impregnates the air with moisture; there are no cold fogs; the wind is soft and mild during winter, in summer refreshingly cool; and the mean annual temperature is 63.5°, that of winter being 49.7°. The cold is often appreciable in early mŏrning and after sunset during winter, but it is warm by midday. The springtime is the best—from the middle of February till the beginning of May; autumn is to be avoided owing to the miasmata from the rice plantations. Consumption is not uncommon among the poor; but then in no part of Spain does the laborer work harder, or subsist on a more meagre diet.

Useful for the overworked man of business, semi-invalids and hypochondriacs, individuals with impaired health but no organic disease, gout and rheumatism, cal-

culous affections, albuminuria, and nervous dyspepsia. There are several towns within easy reach of Valencia where the invalid may go for a short stay,—such as *Alcira, Carcajente, Jativa, San Felipe, &c.*

SEVILLE.—The famous capital of Andalusia, and the city of Figaro, possesses a soft and tonic climate. It may be visited by the hypochondriac, by convalescents from lingering disease, &c.; or the invalid who has wintered in Malaga might advantageously stay here during May. The best part of the year is from November to March. There is considerable rain in October, November, and April. Occasionally during the summer the sultry and irritating levante or east wind prevails, giving rise to fever, ophthalmia, mental irritability, and neuralgic affections.

ARANJUEZ.—Situated 24 miles south of Madrid, on the left bank of the Tagus. The season consists of April and May, during which months the climate is soft and most agreeable. The water of the town contains a little sulphate of soda, and hence it sometimes proves aperient if taken largely.

LISBON.—The capital of Portugal has a dry and bracing climate; though the changes from sunshine to rain, from heat to cold, are sudden and remarkable. Hence it is not to be recommended for pulmonary invalids; while, moreover, phthisis is very prevalent among the inhabitants.

The mean annual temperature is about 62.00°; that for winter being 52.52°, spring 59.66°, summer 70.94°, and autumn 62.48°. The annual rainfall is 23 inches, most wet days occurring in winter. The predominating winds are those from northeast to southeast, and to them is due the cold of winter.

Dr. Francis says that the best situation for an invalid who wishes to pass the winter in Lisbon, is the upper part of the Val de Pereiro; a continuation of the valley in which the new part of the town and the public gardens lie. "Here, upon the southern slope of the hill, are a few villas in the midst of orange gardens, which are well sheltered, and afford choice views over the town and river. Those who prefer a country residence, may select the neighborhood of *Bemfica*, a village on the Cintra road, about a league from Lisbon. The place is in high reputation, among the Portuguese physicians, for the purity of the air, and it is here they send their convalescents."

CINTRA.—A summer residence of the court and wealthy inhabitants of Lisbon, from which it is only sixteen miles distant. Frequent breezes, a humid soil, and an abundance of vegetation render the summer air cool and healthy. The winters are wet and cheerless.

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446. Gibraltar.

This strongly fortified portion of the British possessions occupies a mountainous promontory near the southern extremity of Spain at the entrance of the Mediterranean. The town is built on the western aspect of the rock. It is unsuitable as a residence for invalids. For though the average winter temperature is 57.93°, yet the prevalence of the southeast wind—the levante—renders the locality cold, raw, and very unpleasant. Snow and ice are very rare, but there is considerable rain. The annual rainfall is 43 inches.

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447. Italy.

LAGO MAGGIORE.—The largest of the lakes of Northern Italy. Along its shores are small towns resorted to by English invalids in summer. *Baveno, Arona*, and *Sesto* are the most frequented. But the climate though clear and pure is often marred by the violent thunderstorms which prevail in summer; there are heavy dews at night; while the neighboring glaciers make it cold when the wind blows from that quarter. The air is injurious to phthisical invalids, but useful in general debility, in dyspepsia, and for such as need a cool tonic atmosphere.

LAKE OF COMO.—Situated to the northeast of Milan, from which it is not far distant. The air is genial and mild, the temperature equable, and the heat not oppressive, owing to the alternate play of the tivano or north wind during the night, and the breva or south wind in the day. For ordinary invalids in summer the best situations on the lake are *Balbianino*, *Torno*, and *Bellagio;* but for the consumptive *Varena* is more suitable. *Cadenabbia* and *Tremezzine*, on the shore near the middle of the lake, are very beautiful spots; while according to Dr. Burgess, *Pliniana*, the most noted spot along these classics shores, the supposed residence of Pliny, will not yield precedence to either in climate or situation. The cold in the winter is great, especially at the northern extremity of the lake. No part of Italy perhaps is so suitable for the consumptive in summer, as the Lake of Como. That dreaded disease called pellagra, a kind of leprosy, is not uncommonly seen here. From one-third to a fourth of the lunatics in the Lombardy Asylum are suffering from it, for it induces insanity; while many cases of it, in early stages, are to be found in the hospitals.

MILAN.—This city, the capital of the Lombardo-Venetian kingdom until 1859, when it was made over to Sardinia, is situated in a fertile plain between the Olona and Saveso Rivers, at an elevation of 394 feet above the Adriatic. It is indifferently sheltered from the various winds, so that the climate is cold; snow and rain are frequent during the winter; while the sudden transitions from humidity to a dry harsh air, render it an unfavorable locality for any but the strong. It is frequented by consumptives going to or returning from the South of Italy; but the shorter their stay, the better. In 1831, official returns showed that amongst the Milanese alone, 20,000 individuals were attacked by pellagra.

BRESCIA, PAVIA, VERONA, AND MANTUA.—The principal towns of Lombardy, are all particularly unsuitable for invalids. Agues, fevers, and inflammations are very common. The cold in winter is intense; the atmosphere is saturated with moisture; there are dense clouds and fogs; there are large quantities of rain, in the form of a fine continuous drizzle; and cold winds are very prevalent, especially the northeast.

VENICE.—This city, the Queen of the Adriatic of the poets, is built on piles, in the midst of a lagoon or large marsh, two miles from the mainland of the Continent. It would seem to be slowly crumbling to decay. The climate is mild and equable; the air being impregnated with emanations of bromine and iodine. Consumption is prevalent among the inhabitants. Invalids are not attracted to Venice by the climate, however, but by its historical associations, and many sickly persons are to be found on the favorite promenade—the Piazza of St. Mark. The mean temperature of winter is about 39° F., of spring 54°, summer 73°, and autumn 55°. Drizzling rain sometimes falls for days together. The result of seven years' observation gave a mean of 5½ days of snow in winter. In Venice the dolce far niente practice is fully carried out; the climate being favorable to indolence and voluptuous ease. Contrary to what might be expected, ague is unknown. The tranquillity which prevails over the city is not unfavorable. As the climate is sedative and lowering, it is not fit for those who are depressed by disease; and except in the early stage it is injurious to phthisical patients. It is suitable for such as have a tendency to inflammation, hæmoptysis, &c. Invalids may remain here from the close of autumn to the end of spring; but it is most agreeable in the latter season.

GENOA.—This town, at the head of the Gulf of Genoa, is one of the last places for a consumptive to pass any time at. The vicissitudes of temperature are rapid and extensive; there are sudden gusts of wind; while the biting coldness of the tramontana or north wind, alternating with the warmth and humidity of the sirocco or southeast, the two prevailing winds of Genoa, proves very trying. The best time for a visit to Genoa (not by a consumptive) is about the autumn or beginning of summer. Pneumonia, hæmoptysis, consumption, and catarrh, are amongst the most frequent diseases of the inhabitants.

FLORENCE.—Situated on the Arno, a few hours' ride from Pisa, this city may be an agreeable residence for the very strong. But certainly in no part of England could a more unfavorable climate be found for consumptives. It is built in a deep ravine, almost surrounded by the Apennines, and intersected by a squalid river. It is one of the stations on the western zone of Italy where it rains the most. Extreme cold in winter, great heat in summer, chilling northerly winds, occasional fogs, violent atmospheric and thermal variations,—these are its chief peculiarities in a sanitary point of view. The nervous excitability of Florentines is explained by the

topography of the city. As the birthplace of Dante and Leonardo da Vinci and Machiavelli, &c., as the scene of Savonarola's preaching and martyrdom, as well as for its churches and palaces and magnificent works of art, Florence offers many attractions to the tourist.

PISA.—The dismal aspect of this neglected city surpasses that of any other in Italy. The dreary solitude of the streets causes gloom and melancholy; while everything seems stricken with decay or death. It is often recommended for consumptive invalids; but the climate is mainly indebted to tradition—being mild, humid, and relaxing. The sky is dull and often murky. Perhaps the high walls around Pisa assist in protecting portions of it from the cold winds, especially the Lung' Arno, or that quarter where the invalids reside. The mean temperature of winter is about 45°, spring 59°, summer 74°, and autumn 63°. The winter is colder than at Rome. The air is moist from the great prevalence of southerly and Mediterranean winds. The climate is very depressing—causing general lassitude while it enervates the faculties. Many foreign invalids die within a few weeks of their arrival. Hæmoptysis frequently sets in where there is any tendency of phthisis.

ROME.—Situated on marshy ground at the foot of a range of low hills, about fourteen miles from the sea, and divided by the Tiber into two unequal portions, Rome has not so much to recommend it to those really in search of health as many other places. The climate is mild, soft, and sedative; but malarious effluvia, in a greater or less degree, are never absent. The best time in the year is October and the first ten days of November. The mean annual temperature is 60 49°; that of winter being 46.75°, spring 58.25°, summer 74.24°, and autumn 62.75°. Owing to its exposure to cold winds, the variations in temperature are great and sudden. Northerly winds are common in the morning and evening, though in the middle of the day the wind blows from the south. The tramontana is cold and searching; but the prevalent wind is the sirocco from the southeast, which is hot, sometimes dry, and sometimes so moist as to render the streets slippery and damp. Under its influence the tissues relax, appetite fails, bowels become torpid, spirits flag, and the weakly get oppressed with lassitude and headache. If an invalid will go to Rome in the winter, let him spend as much time as he can in St. Peter's. No other public building can compare with this church as regards possessing a dry equable temperature all the year round. The mild genial air in its interior is so prized, that the sickly meet and promenade in St. Peter's when the weather will not permit of exercise in the open air.

Dr. Burgess entertains a very unfavorable opinion of the sanitary value of this city. And he points out that the popular feeling in favor of a mild and relaxing climate for consumption is altogether wrong, being based upon erroneous data, if not upon mere tradition. A cold climate, such as that of Norway or of Canada, and still air, are evidently more rational indications, if the formation of tubercle is the result of a relaxed state of the vital functions, involving impaired digestion, depraved nutrition, and degeneration of the blood. Nothing is more calculated to derange the digestive organs than the sedative influence of a malarious atmosphere. The mild climate allays bronchial irritation, at the expense of the general health and of disordered nutrition.

The most fitting localities in the city for the invalid with any bronchial irritation, chronic rheumatism, &c., are the north and west sides of the Piazza di Spagna, as having a southern exposure; or he may choose one of the streets running east and west from, and near to, the Piazza,—the Strada de' Condotti, Strada della Croce, Strada Frattina, &c., the north sides of which gain the southern sun, and all of which are on sheltered ground. The south side of the Strada del Corso should be avoided, as the Tiber frequently overflows in winter, generating low fever, &c. The Piazza del Popolo is also subject to damp fogs. In most cases the second and third floors of a house are preferable to the first; since, owing to the narrowness of the streets, they are more exposed to the sun. The higher and more exposed ground of the Monte Pincio, Via Sistina, Piazza Barberina, &c,, is suitable for those with healthy chests, and who can bear a high wind. The stay may extend from October till the end of May.

NAPLES.—The climate somewhat resembles that of Nice, but is more variable and humid. Situated on the northern shore of the Bay of Naples, on the slopes of a range of hills, near the foot of Vesuvius, this city seems to offer all that is charming to the man in health, and everything that is pernicious to the invalid. The mean annual temperature is 60.26°; winter being 47.65°, spring 57.56°, summer

74.38°, and autumn 61 46°. Besides other winds, it is exposed to the sirocco or southeast, which is enervating to both body and mind; as well as to the mistral or northwest, which is raw, piercing, cold, and damp. Catarrh, pneumonia, phthisis, rheumatism, ophthalmia, uterine disease, and cutaneous affections, are common amongst the inhabitants. Eustace says, and apparently with reason,—"If a man be tired of the slow lingering process of consumption, let him repair to Naples, and the dénouement will be much more rapid." Indeed, so fatal is the climate to invalids with pulmonary disease, especially during the winter, that the proverb,—"Vedi Napoli e po' mori," may be interpreted in a more literal sense than that intended.

BAIÆ AND POZZUOLI.—Situated in the vicinity of Naples, these towns are recommended by M. Carrière as winter residences for invalids already sojourning in the Neapolitan territory. The air is humid and warm, and little disturbed by violent winds. But the undrained swamps in the neighborhood of Baiæ, and the fatality of phthisis at Pozzuoli, ought to deter any invalid from leaving England for these stations of classic renown, however anxious he might be to escape to them from Naples.

ISCHIA.—The island of Ischia, in the Mediterranean can be reached by steamer from Naples in about three hours; or the sea passage may be much shortened by driving from Naples to Miliscola, crossing over to the small island of Procida, only two miles and a half distant, and thence to Ischia, which is separated from Procida by a channel two miles in breadth. The circumference of Ischia is rather more than twenty miles. Nearly in the centre of the island is Monte Epomeo (the Mons Epomeus of the ancients), the highest point of which is 2574 feet above the level of the sea. Bishop Berkeley seems to have been delighted with a three or four months' residence at Ischia. Thus he speaks of the island as "an epitome of the whole earth;" containing within a compass of eighteen miles a wonderful variety of hills and valleys, ragged rocks and fruitful plains, barren mountains and beautiful vineyards, cornfields and orchards, natural fountains and rivulets, &c., "all thrown together in a most romantic confusion." The air in the hottest season is refreshed by cool sea-breezes. The hedgerows are of myrtle, with the aloe and prickly pear; and there is an abundance of delicious fruit.

The baths of Ischia have been in repute for centuries. Strabo and Pliny were acquainted with the virtues of some of the waters. Their chief characteristics are the large quanties of chloride, sulphate, and carbonate of soda which they contain; combined with magnesia, lime, &c., and a large volume of carbonic acid gas. Their temperature is high: *e. g.*, that of the Acqua del Tamburo is 210° Fahr., and that of Petrelles on the south side of the island 205°.

The principal and most picturesque village on the island is *Casamicciola;* which is situated on high ground behind Lacco, is sheltered on the northwest and south sides by Monte Epomeo, and is in the neighborhood of the chief springs now in use. These springs rise in the Val Ombrasco, a ravine at the base of Monte Epomeo. The most celebrated spring is the *Acqua di Gurgitello,* which is used for bathing and drinking. It contains chloride of sodium, carbonate of soda, sulphuretted hydrogen, and nine cubic inches per cent. of free carbonic acid gas; while the temperature of the water is often as high as 170° Fahr. This spring is useful in cases of chronic gout and rheumatism, sciatica, scrofula, nervous irritability, &c.

Near the Gurgitello is the *Acqua di Cappone,* used for drinking only. The water, like that of Wiesbaden, has the taste of chicken broth: the temperature is 98° Fahr. Dr. A. Vans Best tells the author, that the Italians praise this water for its good effects in renal, vesical, and uterine complaints.

Below Casamicciola is the pretty village of *Lacco;* in which are the hot air and sand-baths of *Santa Restituta e Regina Isabella.* The most celebrated natural vapor-bath in the island is the *Stufa di S. Lorenzo;* the steam from which is discharged from crevices in the lava at a temperature of 135° Fahr.

Independently of its remarkable mineral springs the climate of Ischia is delightful. The evenings are rather cold during the winter and spring months, but the air is genial throughout the day. The heat of summer is mitigated by the sea-breezes, while the vines and orange trees afford a beautiful shade. A stay of some weeks on the island can be recommended in hepatic and splenic disorders, in the early stages of Bright's disease, and other forms of renal mischief, as well as in gouty and rheumatic and neuralgic affections. Invalids from India might well be advised to recruit at Casamicciola.

448. The Ionian Islands.

This group of islands in the Mediterranean, off the west coast of Greece and Epirus, ceded to the Greeks by Great Britain in 1863, consists of *Corfu*, *Cephalonia*, *Zante*, *Santa Maura*, *Ithaca*, with many smaller islands. Their surfaces are mountainous and rugged, but in some of the larger islands there are fertile plains. They vary but little in climate; the winters being stormy and wet with northerly winds, the springs warm, and the summers dry and hot. Intermittent and remittent fevers, dysentery and diarrhœa, phthisis and pneumonia are prevalent. As a tour for the hypochondriac a visit to these islands may be recommended.

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449. Malta.

Of an area not much exceeding that of the Isle of Wight, this island forms the chief station of the British fleet in the Mediterranean, and is daily called at by ships of all nations. The atmosphere is clear and bright, the annual rainfall about 15 inches, the air mild and bracing in winter, and the temperature equable with a yearly average of about 64°. Heavy gales of wind are not very frequent, though the atmosphere is never entirely calm. The gregale or northeast wind is cold in winter, and often does damage in the harbor of Valetta; while the sirocco or southeast prevails especially in August and September, is hot and humid, and produces lassitude with debility.

The Rev. James Sherman, who suffered from consumption, writing from Malta on January 16th, 1861, said,—"A blazing sun shoots his rays into my room, and a delicious breeze makes it sufficiently cool. I look out on a sort of Regent Square—people traversing up and down in crowds—a beautiful garden opposite my window, with hundreds of oranges on the trees—priests, beggars, and guides, jostling one another in every direction—a side view of the ocean—a deep blue sky, without a cloud—and at night the stars looking so large, near, and brilliant, that I can scarcely believe I am only 4½ days from the frost and snow of England. The climate seems most delicious, and well adapted to invalids."

The weather is most agreeable from the middle of October until the end of January. Asthma connected with chronic bronchitis, atonic dyspepsia, strumous glandular swellings, and deranged health from overwork,—these are the cases which are most likely to be benefited by a stay in the cheerful bustling capital of Valetta.

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450. Egypt.

One of the earliest civilized localities of the world, this country has long been divided into the provinces of *Said* or *Upper Egypt*, *Vostani* or *Middle Egypt*, and *Bahari* or *Lower Egypt*. Upper and Middle Egypt are more healthy than the Delta. There are only two seasons in Egypt,—the temperate, from October to March, and the hot, from March to October. At *Cairo*, the capital, the climate is healthy, little variable, and remarkably dry; rain falling very rarely. The nights and early mornings during winter are cold, especially those of the last half of December and the first fortnight of January. The mean temperature of the year is 72.2°; that of winter being 58 5°, and of summer 85.1°. Taking the whole of Egypt the mean temperature in December, January, February, and March, may be said to be about the same as that of this country in June, July, and August. Between April and June a hot wind sometimes blows from between the south and southeast. It is known as the "khamseen," because this word is the Arabic for fifty; and these winds are most prevalent during the fifty days preceding Whitsuntide. A khamseen may continue for two or three or more days: the air is rendered hazy from the

sand and dust suspended in it; while the thermometer, in a sheltered spot, will often reach 110°.

The invalid should leave England rather early in October, so choosing his time of sailing by one of the Peninsular and Oriental Company's steamers as to be able to see the best spots on the south coasts of Spain and Portugal, Gibraltar, and Malta. This arrangement will usually be preferable to that of beginning the voyage at Marseilles. From Malta to Alexandria occupies only a few days: the traveller ought to arrive at the latter by the middle of November. Leaving this port as soon as "the sights" are visited, he proceeds to Cairo by railway; whence he begins to ascend the Nile, so as to reach Thebes by the beginning of December. The climate of Thebes is all that the valetudinarian can desire; and hence he may either remain there, or proceed southerly in the direction of Nubia. But, however far his trip may extend, he should be back in Cairo by the end of March; whence he may arrange his home journey, by way of Greece and Constantinople, so as to be in England by about the latter part of June.

The necessity for travelling by and living in boats after leaving Cairo, has, of course, certain disadvantages, and is somewhat expensive. But with a dry balmy atmosphere, and a sky bright and cloudless, the invalid may find much that is most agreeable and exhilarating in the even progress of a Nile boat,—a dahabeeh. The two chief annoyances to the traveller in Egypt are the dust and "Baksheesh." The former may be mitigated by suitable clothing,—mohair dresses for ladies, and flannel shirts with tweed suits for gentlemen; while the latter must be avoided by not exhibiting too much liberality, and by bargaining beforehand with dragomen, guides, coachmen, boatmen, &c. The diet should be simple and unstimulating, but nourishing; light Hungarian or Bordeaux or Rhine wines are preferable to port and sherry and brandy. Bitter beer is often serviceable; but stout and porter should be avoided. Purgatives ought to be taken as seldom as possible. Cod-liver oil often disagrees; while all preparations of bark are more than ordinarily apt to produce headache and hepatic derangement. The climate may especially be recommended in the early stages of tuberculosis, in chronic bronchitis, in clergyman's sore throat, tertiary syphilis, some forms of asthma, gout, and rheumatism, renal diseases, dyspepsia, and affections of the nervous system.

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451. Algiers.

The city of Algiers, the capital of an extensive country of Northern Africa, bordering on the Mediterranean, has been much resorted to by invalids. It can be reached easily in seven or eight days from London; by way of Folkestone, Paris, Lyons, Marseilles, and thence by steamer in forty-eight hours. About the end of October is the best time for the invalid's arrival on the coast of Africa; the great heat having then usually ceased, and the first rains having refreshed the lands, so that the country has the appearance of spring.

Speaking of this city, Dr. Mitchell says that with difficulty, if at all, will the European traveller find a spot on earth where natural beauties so combine with those of man's creation to please and interest him. One of the long sides of the oblong of which the "Place du Gouvernement" is formed is open to the sea; commanding a view of the bay, the harbor, the peaks of the distant Atlas, and the verdure of the Sahel slopes. The "Place" itself is filled with a strange mixture of all races; the Arab, the Moor, the turbaned Jew of Africa, the Maltese fisherman, the Spanish fruitseller, the veiled women of Moslem, the picturesque Jewess, the pretty Spaniard, &c., &c. The invalid will find objects of interest without seeking them, and will be gratified and amused merely by wandering in the open air. The mean annual temperature is about 66.50° Fahr. The mean temperature for each season is: winter 56.91°, spring 67.60°, summer, 77.73°, and autumn 63.80°. The rainfall is 36 inches; rainy days 96. Winter fogs are rare. Snow has fallen once in seven years. Compared with other points on the Mediterranean, Algiers has a warmer and a less varying climate than Marseilles, Nice, Genoa, and Naples; while it more nearly approaches, but is still superior, to Malta, Corfu, and Gibraltar. Dr. Mitchell quotes the opinions of M. Odrultz, which are to the following effect: 1st. The climate of Algiers is opposed to the generation as well as to the evolution of

tubercle in the lungs. 2d. This morbid production is observed but very exceptionally among the indigenous population. 3d. Europeans who do not bring the germ of the disease to Algiers, almost never become phthisical. 4th. Those who do bring not only a predisposition, but actually crude tubercle, in greater or less quantity, in the lung, are often cured; or, in the worst cases, the progress is extremely slow. 5th. When the tubercle has softened, the climate is no longer favorable, but the reverse.

The climate is also beneficial in laryngeal and bronchial affections; in chronic heart disease; in gout and rheumatism; and in renal disorders. Nervous complaints, paralysis, epilepsy, and convulsions, are aggravated by it. Cerebral congestions, gastric and hepatic disturbances, and a plethoric condition of the uterine organs, appear to be common in Algiers.

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452. The Azores—Madeira—Canaries.

THE AZORES OR WESTERN ISLES.—This group of nine islands, belonging to Portugal, lies in the midst of the Atlantic Ocean. They are of volcanic origin, all possess similar features, and all have mild equable climates. The atmosphere is saturated with moisture. A winter trip to the Azores may be recommended where a soothing relaxing climate is needed. Hence it is beneficial in inflammatory dyspepsia, bronchial irritation with scanty secretion, and in the premonitory stage of consumption. Sir James Clark thinks that a change from the Azores to Madeira, and from thence to Teneriffe, would in many cases prove more beneficial than a residence during the whole winter in any one of these islands.

MADEIRA.—Of the group of Madeira Isles, the largest and most important is Madeira, about 120 miles in circumference. Funchal, its capital, has long enjoyed great reputation as a winter residence for the phthisical. It is almost certain that this reputation is now undeserved. Where the disease is advanced and the irritable lungs are soothed by a humid heat, some of the distressing symptoms of phthisis are alleviated by a stay at Funchal; but such relief does not stay the increase and degeneration of tubercle. The invalid who leaves this country about the middle of October, can reach Madeira in from ten to fourteen days; where he will find himself in a tropical climate, with an unclouded sky, a glowing sun, a deep blue sea, a luxuriant and varied foliage, and beautiful hills, which were covered with flourishing vineyards. Since the autumn of 1852, however, when the vine disease suddenly broke out, there has been a sad change; the plants still being destroyed by the deadly fungus. The return voyage should be undertaken about the beginning of June.

The climate of Madeira is mild, equable, and moist. There are occasional storms of wind and rain, and fires are often necessary in the mornings and evenings. The mean annual temperature is 64.9°; that for winter being 60.6°, spring 62.3°, summer 69.5°, and autumn 67.3°. The annual rainfall is 29.23 inches; the days on which there is wet being about 70, whereas in London they number 178. The most injurious wind is the hot parching leste, from the east-southeast; which is often charged with a fine dust, very irritating to the air-passages.

The invalid who cannot bear a dry and irritating climate, but needs a mild and soft and relaxing atmosphere, will obtain it here. Laryngeal, bronchial, and pulmonary diseases are soothed; and benefit may be derived by a few patients threatened with consumption, provided their symptoms are marked by irritability and an excess of vascular action. Hypochondriacal and rheumatic and neuralgic patients ought especially to avoid Madeira. Should the invalid wish to spend a second winter in Madeira before returning home, a voyage may be taken to Teneriffe in June, and the stay prolonged there until the end of October.

THE CANARY ISLANDS.—This group (Fortunatæ Insulæ) consists of seven principal islands and several islets. The climate differs from that of the foregoing in being warmer, drier, and less relaxing. At *Santa Cruz*, the capital of *Teneriffe* (the only island possessing good accommodation for the valetudinarian), the mean annual temperature is 70.15°; that for winter being 64.85°, spring 68.87°, summer 76.68°, and autumn 74.17°. Orotava and Laguna are sometimes preferred to Santa Cruz.

453. Cape of Good Hope—Natal.

THE CAPE OF GOOD HOPE.—The climate is mild and healthy but very dry. The seasons are the reverse of those in Europe; December and January being the warmest, while June and July are the coldest months. The mean temperature for the winter months of 1858, at Cape Town, was 57° Fahr. The prevalent diseases appear to be rheumatism and dysentery. Invalids from India are often benefited by spending a season at the Cape or at Natal.

NATAL.—This British Colony lies on the southeastern border of Africa, about 800 miles from the Cape of Good Hope. There may be said to be only two seasons,—the summer from October to March, and the winter from the beginning of April to the end of September. Even in the latter, during the coldest months of 1858, the temperature was occasionally 78° Fahr. in the neighborhood of Maritzburgh; while in the hottest months it was occasionally below 60°. (*The Colony of Natal.* By Robert J. Mann, M.D., p. 48. London, 1860.) Notwithstanding its almost tropical position, and the frequent vicissitudes of temperature, Natal is very healthy. Dr. Mann remarks that while 480 soldiers die yearly out of every 1000 stationed at Sierra Leone, 121 in 1000 at Jamaica, 78 in 1000 in the West Indies generally, 48 in 1000 in the Madras Presidency, 28 in 1000 at Bermuda, 27 in 1000 in the Mauritius, 25 in 1000 at St. Helena, 21 in 1000 at Gibraltar, 16 in 1000 at Malta and Canada, and 14 in every 1000 in Nova Scotia and New Brunswick,—only 13 in 1000 die yearly in the western districts of the Cape Colony, and only 9 in 1000 in the eastern district. During the Kafir war in 1835, not a single officer or man was invalided during the five months of active service. Newly-arrived settlers in Natal remain for months under canvas, without the slightest injury.

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454. Canada—New Brunswick—Nova Scotia—Newfoundland.

CANADA.—This British Colony of North America is divided by the Ottawa River into the provinces of Upper or West Canada (chief city, Toronto), and Lower or East Canada (chief city, Quebec). The climate is marked by extremes, the winters being excessively cold, while the summers are just as hot. The coldness of the winter is mitigated, however, by the dryness of the air and the absence of high winds; while the way in which the Canadian protects himself with thick furs, and his house by well-managed stoves, enables him to set the frost at defiance. A gentleman, resident in Canada for six years, told the author that with the thermometer —20° he never felt the cold so raw and unpleasant, as in London at the beginning of January, 1864. The climate is also much milder in Upper than Lower Canada; but that of both provinces is healthy and conducive to longevity.

NEW BRUNSWICK.—The climate of this portion of British North America resembles that of Canada; the winters being very severe and the summers excessively hot. The winter, however, is mitigated by the length and fineness of the autumn,—the "Indian summer."

NOVA SCOTIA.—This peninsula of North America, forming part of the British colonial territory, is separated from New Brunswick by an isthmus 14 miles across. The climate is remarkable for vicissitudes of temperature, prolonged falls of rain, and occasional fogs. The inhabitants, nevertheless, are said to enjoy a remarkable degree of health.

NEWFOUNDLAND.—This island, lying off the coast of Labrador, is separated from the mainland by the Strait of Belleisle, which is 12 miles across. The surface of the island is mostly marshy, and the soil unfavorable to cultivation. The winters are less severe than in Upper Canada, but the summers are shorter. Dense fogs prevail along its banks, sometimes for the greater part of the summer. The annual mortality, however, scarcely exceeds 12 per 1000 of the population, so that the climate must be favorable to the constitution.

455. West Indian Islands.

Invalids should not be sent to any of these islands; for though they are not as unhealthy as was formerly supposed, yet severe fevers and inflammatory diseases are common and run a rapid course. Moreover, the returns show that nearly twice as many cases of consumption originate among our troops stationed here, as at home. If a man in search of health will visit them, however, he must only do so between the months of December and April, after the heavy autumnal rains. JAMAICA, the chief of the British possessions, is reputed the most healthy. The BAHAMAS are resorted to by American invalids. In the BERMUDAS and in BARBADOES, dysentery, rheumatism, and yellow fever are the prevailing diseases.

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456. Hill and Marine Sanitaria in India.

The Indian *hill stations* offer a climate which is of great use to convalescents from fever, invalids from local cachexia, &c.; and which exerts a powerful influence in maintaining the health and vigor of Europeans—especially of such as have not been very long in India.

According to Dr. W. J. Moore, of the Bombay Medical Service, the climate of the hill ranges differs from that of the plains in having a mean temperature some 10° to 15° cooler, in being above the influence of the hot winds, and in being more humid during the monsoon season. Various localities differ in minor points; in the *Himalayas*, a greater elevation will procure a colder climate; the fall of rain has sometimes been excessive at *Mahableshwar*, at *Nynee Tal*, &c.; while at many of the hill stations sanitary laws are still too much disregarded, and too little care is taken to protect the system from the inclemencies of the weather.

The climate of the hill stations in the *Himalayas*, of *Mount Aboo*, of *Ootacamund*, *Bangalore*, &c., as well as of *Matheran* and *Mahableshwar*, in *Bombay*, is of great service to the European whose health has deteriorated from a residence on the Indian plains. The air invigorates both mind and body. But it is unsuitable where there is structural disease of any internal organ; diarrhœa and dysentery being increased by it, while affections of the brain and lungs and liver are much aggravated. Cholera, dysentery, and malarious fevers are less prevalent and fatal in the hill stations than in the plains below. Yet these affections are met with at high elevations; as are also cases of hepatitis, tuberculosis, typhus, croup, diphtheria, small-pox, rheumatism, neuralgia, severe catarrh, and hill-diarrhœa. It has been well suggested that European troops should be located more on the hills and less on the plains than is now the case; not waiting until they are weakened by disease, climate, and service to be sent to these more temperate and less malarious regions.

Many of the diseases which are aggravated by the hill stations of India, are much benefited by the greater purity and uniformity of the *sea climates*. The invalid who has been prostrated by the harsh parching winds of the interior, not only has his bodily sufferings greatly ameliorated by the moist fresh breeze from the sea, but the mere sight of the ocean raises his powers by giving him hope and confidence. It is necessary to select an open spot, with high cliffs and a rocky shore; low, flat, sandy coasts being generally unhealthy in the tropics. The proximity of the island of *Martaban* to Madras and Calcutta, as well as its geological characteristics, have led Dr. Macpherson to recommend it as a marine sanitarium.

The weak-chested, and those persons of a strumous habit predisposed to phthisis, are often greatly benefited by a residence in India; but where tubercle is deposited in the lungs, the climate seems to accelerate the progress of the disease. Individuals of a phlegmatic temperament who have more or less difficulty in digesting their food, and who possess a languid circulation, often improve very much in this country.

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457. Australia—Tasmania—New Zealand.

AUSTRALIA.—The immense extent of territory known as Australia, in the South Pacific Ocean, possesses a temperate climate, which appears very favorable to the European constitution. In speaking of this antipodal region it is necessary to remember that the meteorological phenomena are generally the reverse of those expe-

rienced in this country. Thus the months of December, January, and February correspond to our summer, and have a mean temperature of about 80°; while those of June, July, and August constitute the winter, the thermometer marking on an average 40° in an exposed situation.

In May, 1836, the number of settlers in the district of *Victoria* (formerly Port Philip) was 177. At the end of a quarter of a century (April, 1861), the amount had increased to 540,322. The total area of Victoria (86,831 miles) is nearly as large as that of England, Scotland, and Wales united. *Melbourne*, the capital of Victoria, is the most prosperous commercial city of the southern world. The mean annual temperature is 57°; extreme cold in winter, and excessive heat in summer (except nine or ten times in the season, under the influence of hot winds), being unknown. Although the annual rainfall is 26 inches (that for London being 21.6), yet the average number of wet days is much less than in Great Britain; for in Melbourne the rain falls with great violence, but it only lasts a few hours, and then the sky clears. A continuance of cloudy weather is unknown. There is a genial sun, with a pure, dry, stimulating air.

Dr. S. Dougan Bird says (*Australasian Climates, and their Influence in Pulmonary Consumption*, p. 41, London, 1863), that the main characteristics of the Victorian climate are these. "It is a temperate warm climate, whose average summer heat is but two or three degrees above that of London; while in winter it is warmer than Nice or Naples, and as warm as Valencia or Barcelona; and actual cold is never felt at or near the sea-level. The air is generally dry, always stimulating and ozoniferous; but so tempered by the prevalence of ocean winds, that it is prevented from becoming irritating, like that of Nice or Provence. With this there is a very large proportion of sunny cheerful weather during the whole year. In no climate with which I am acquainted is there so much pleasant weather during the year as in Victoria—so many unclouded days, when it is neither too hot nor too cold—and an invalid has, consequently, every temptation to be in the open air."

Tuberculosis (*i. e.*, scrofula; phthisis, tabes mesenterica, and tubercular meningitis) is rare in Victoria, the mortality not being one-fourth of that in Great Britain from the same cause. Yet the population is composed of those who, hereditarily, from occupation, and mode of living (except that animal food is much cheaper) are as much predisposed to consumption as the inhabitants of London or Liverpool.

In the penal establishments of *Pentridge* and *Collingwood* (the former five, the latter two miles from Melbourne), with an average of 1000 male adult prisoners, the greater number undergoing long sentences, there was no death from consumption in 1860 or 1861. Comparing this with the statistics to be found in the Reports of the Directors of Convict Prisons in England, it appears that at Millbank, the greatest number of male prisoners in confinement at any one time during 1860 was 741, the daily average throughout the year being 531, and the total number in the year, 2404. Of these, 2 were recommended for pardon on account of advanced consumption, two died from the same, and 102 were removed to the invalid prisons of Dartmoor, Lewes, or Woking, on account of phthisis. These numbers, moreover, do not include 16 who were removed for hæmoptysis.—At the same prison, in 1861, the greatest number of such prisoners in confinement at one time was 809, the daily average throughout the year, 515, and the total number in the year, 2612. Of these, 5 died from phthisis, and 132 were removed to invalid prisons on account of it. This number also does not include 19 removed for hæmoptysis.

At *Sydney* (the capital of New South Wales, East Australia) the mean annual temperature is about 65°. Heavy rains fall between June and September. Disease is said to assume a milder form here than in European countries. Dysentery and pulmonary affections are, however, not uncommon. The winters are colder than at Moreton Bay, though this season is very salubrious and agreeable.

Moreton Bay (Queensland, East Australia) has a fine winter climate, which proves very useful in advanced cases of phthisis, when combined with irritability of the system and a tendency to bronchial inflammation. The average temperature on the coast during the cold months is 62° or 63°; the air being soft and sedative and the weather brilliant and sunny. A few miles inland the ground rises, and the air is more dry and bracing.

In cases of consumption with copious expectoration, and in the chronic bronchitis of old people, *Adelaide*, the chief city of South Australia, may be chosen as a residence. The air is dry, warm, and tonic; the winter temperature averaging 58°.

The invalid leaving England for Australia will generally find the long uninterrupted voyage round the Cape of Good Hope, in a comfortable ship, much to be preferred to the more exciting and fatiguing "overland route," by way of Suez and Galle. The best time for leaving this country is from the middle of October to

the end of November, when the new home will be reached in about 90 days from Liverpool. Thus, supposing the traveller to arrive about the end of January, he will find a pale blue cloudless sky, and the thermometer at 90° in the middle of the day, without any unpleasant sense of heat. With a feeling of new life, general exhilaration, and a good appetite, he will experience a desire to be at work. The difficulty seems to be to persuade the phthisical that they are not cured, and that the general rules of hygiene must be adopted, and all excesses avoided, to prevent the pulmonary mischief again starting into activity, or to escape hepatic congestion, or that he may obtain and retain health and vigor.

TASMANIA.—This island (known as Van Diemen's Land, until the abandonment of transportation, in 1852) is separated from the southernmost point of Australia by Bass's Strait. The chief towns are *Hobart Town* in the south, and *Launceston* in the north; the climate of both being salubrious and delightful, and highly conducive to longevity. The latter port is reached in 24 hours, by steamer, from Melbourne, and is beneficial to such cases as are usually sent to Pau. The air is moist, sedative, and equable. In the winter months of June, July, and August there is never great cold during the day. The mean annual temperature of Hobart Town is 52°. Tasmania is described as "the Garden of Australia."

NEW ZEALAND.—This group, in the South Pacific Ocean, consists of two principal (the North and Middle) and several smaller islands. The chief British settlements are *Auckland*, *New Plymouth* or *Taurauki*, *Hawkes Bay*, and *Wellington*, in the North Island; with *Nelson*, *Marlborough*, *Canterbury*, and *Otago*, in the Middle Island. The temperature of New Zealand is marked by its uniformity. The mean of the warmest month at Aukland is 68°, and of the coldest at Otago 42°. The climate, which in general terms may be described as mild and soft, appears to be favorable to the European constitution.

XX. MINERAL WATERS.

458. General Observations.

Mineral waters have been used in medical practice since the days when Æsculapius was worshipped throughout Greece, and when his temples were erected in healthy places, near wells which were believed to have healing powers. Like many other important remedies, their virtues have been regarded with singular skepticism at one time, and with blind credulity at another. The practitioner in the present day wisely attempts to keep the middle course; neither overestimating nor unduly depreciating the value of these agents in subduing disease.

A mineral water is merely a complicated medicine, containing various salts and gases blended together. The ingredients are generally derived from the soil or rocks through which the waters pass, and they consist especially of chloride of sodium, sulphate and carbonate of soda, sulphate and carbonate of magnesia, some salt of lime, carbonate of iron, bromine and iodine, organic matters (barègine), and more or less of a free gas (sulphuretted hydrogen, carbonic acid, nitrogen, or oxygen). The cause of the temperature of hot springs is a mystery, and philosophers know not whether it is due to the internal heat of the globe, to electricity, to chemical decomposition, or to volcanic agency. The heat is generally much under that of boiling water, and in most springs it is found to have varied but little during a long succession of years. The only waters which have a temperature as high as 212° Fahr. are the geysers or hot springs of Iceland.

Mineral waters are administered internally and applied externally. They act chiefly by diluting and purifying the blood, increasing the processes of secretion and excretion, so that morbid matters are eliminated from the system. They likewise stimulate the cutaneous and visceral circulation. It cannot be doubted that these effects are in some measure due to the chemical composition and temperature of the waters; though it is allowed on all hands that the beneficial influence is largely aided by the locality of the spring, the nature of the climate, the absence of business and care, the diet, and the general regimen.

Mineral waters are useful only in chronic disorders, where there is but little, if

any, structural change; or in cases where disease is threatened. Hence, the sufferers sent to the Spas are for the most part affected with skin affections, strumous and other rebellious ulcers, stiffness of joints and limbs from old sprains, &c.; chronic gout, rheumatism, sciatica, or neuralgia; gastric, hepatic, or renal disorders; sluggish action of the intestines, particularly of the colon and rectum; paralytic affections, where all active disease has been subdued; hysteria or hypochondriasis; or with certain functional disorders of the uterine system. Nothing but mischief can arise where there is either acute disease, tuberculosis, cancer, fatty degeneration of any important structure, aneurism, or mischief about the heart or large vessels. Where there is any predisposition to cerebral, pulmonary, gastric, or intestinal hemorrhage all thermal mineral waters (especially in the form of baths) are contraindicated. The young, and the very aged, moreover, will derive little or no benefit, and in pregnancy the use of the springs, to say the least, demands great caution.

The time for residing at some of the Spas is from the beginning of May until about the close of September, but at several of the foreign ones it is only from June until the end of August. At a few of the hot springs invalids (chiefly the gouty) remain through the winter. The treatment, however, is not commonly to be prolonged beyond six or eight weeks, and often three or four will suffice. The invalid should not be led to expect immediate relief. And he should be cautioned against the popular idea that the benefit derived will be in proportion to the quantity of water taken, while it may be as well to let him know that "critical eruptions" (psydracia thermalis) and "critical fluxes" are neither necessary nor advantageous. As a rule, bathing and drinking ought not to be commenced on the same day, and at first only a moderate quantity of the water should be taken,—two or three of the ordinary glasses before breakfast and one or two in the evening. After a time, a glassful may also be taken before dinner. Very hot water is to be cooled, and very cold to be warmed, before drinking.

When the strength will permit of it, early rising (at about 6 o'clock) is to be recommended, so that the doses may be taken before breakfast. The contents of the tumbler are to be sipped slowly and methodically, not hastily swallowed like a nauseous draught, and an interval of 15 minutes, at least, should be allowed between each glass, which time may well be spent in a short walk. An hour after the last glass a light breakfast is to be taken; then a gentle saunter, the bath, reading, writing letters, &c., will agreeably occupy the hours till the early dinner, at which fruit and raw vegetables had better be avoided, while a moderate quantity of light wine or of mild bitter beer can be permitted. An excursion to the objects of interest in the neighborhood, perhaps one or two more glasses of water—never more than half the quantity taken in the morning, a light supper at 8 o'clock, and bed two hours afterwards will complete the day's work.

Mineral waters are sometimes classified into the thermal or hot, and the cold springs. But a more useful division is into chalybeate, sulphurous, gaseous or acidulous, saline, iodo-bromated, and muriated lithia waters.

Class 1. *Chalybeate or Ferruginous Waters.*—A large number of waters contain small quantities of iron, but none are considered as belonging to this class unless the proportion of metal is considerable. The chief acidulous chalybeates (those which contain much carbonic acid gas), are the waters of Schwalbach, Spa, Pyrmont, Brückenau, the Cambray well at Cheltenham, and Tunbridge Wells. The principal saline acidulous chalybeates (such as, in addition to iron and carbonic acid, have a certain amount of sulphate and carbonate of soda, with chloride of sodium) are the springs of Franzensbad, Bocklet, Harrogate, &c. Chalybeate waters are useful in anæmia and in functional disorders of the generative organs.

Class 2. *Sulphurous Waters.*—They have the odor of rotten eggs, owing to their impregnation with sulphuretted hydrogen. The chief sulphurous thermals are those of Aix-la-Chapelle, Baden near Vienna, Aix-les-bains, Barèges, Bagnères de Luchon, St. Sauveur, Cauterets, Eaux-Bonnes, and Eaux-Chaudes; the higher the temperature the more stimulating the effect of the water on the nervous and vascular and cutaneous systems. Amongst the cold sulphurous springs may be mentioned Harrogate and Bocklet. Sulphurous waters are recommended in cutaneous, hepatic, uterine, rheumatic, gouty, neuralgic, and old constitutional syphilitic diseases. In chronic poisoning by mercury, lead, or copper they help to eliminate the injurious mineral. The excretion of carbonic acid by the lungs and skin, as well as of urea and uric acid by the kidneys, is probably increased by these waters.

Class 3. *Gaseous or Acidulous Waters.*—The carbonic acid gas gives these waters a sharp acidulous taste, with a sparkling appearance. The most important are the thermal springs of Vichy and the cold of Fachingen and Bilin. The refreshing

and exhilarating waters of this class are recommended in dyspepsia, hepatic derangement, gout, and rheumatism, &c.

Class 4. *Saline Waters.*—Those which are purgative and have sulphate of soda or sulphate of magnesia as their chief ingredients, are Epsom, Cheltenham, Leamington, Seidlitz, Püllna, Carlsbad, and Marienbad. They are useful in habitual constipation, torpidity of the liver, inactivity of the abdominal viscera generally, chronic rheumatism, sciatica, and perhaps in diabetes (Carlsbad especially). Those saline waters which have chloride of sodium as their characteristic ingredient, are Wiesbaden, Baden-Baden, Homburg, Kissingen, &c. They are employed in cases of scrofula, rheumatism, dyspepsia from overwork, and irregularity of the bowels. The sulphate or carbonate of lime, or both, predominate in the thermal waters of Bath and Buxton, while the carbonate or bicarbonate of soda is the characteristic ingredient of the thermal springs at Ems, Teplitz, &c.

Class 5. *Iodo-bromated Waters.*—The springs at Kreuznach are the most celebrated of this class, while in England there is the Woodhall spa. The waters are used in all forms of scrofula, in many chronic skin diseases, in uterine tumors, and in old-standing constitutional syphilis.

Class 6. *Muriated Lithia Waters.*—The springs of Baden-Baden have considerable reputation for the cure of gout and the uric acid diathesis, owing to the chloride of lithium which they contain.

459. Tunbridge Wells in Kent and Sussex.

This town is more visited on account of its dry bracing air, beautiful varied scenery, and fine walks, than for its chalybeate spa. The water of the latter has a temperature of 50°, is feebly ferruginous to the taste, contains about a quarter of a grain of *oxide of iron* to the pint, and has just sufficient *carbonic acid* to hold the metal in solution. Frequently increased doses of steel are given with the water, or sulphate of magnesia may be added if an aperient be needed. The chief value of the spring is witnessed in cases of anæmia and chlorosis, debility inducing dyspepsia, and in general lassitude from a too sedentary mode of life.

460. Bath, in Somersetshire.

The thermal mineral springs, situated in the southern part of the town near the Abbey church, are four in number. The temperature of the waters varies from 120° Fahr. to 104°. Speaking generally, the solid contents are about ten grains to the pint. The chief constituents are *sulphate of lime*, *sulphate of soda*, *chloride of sodium*, *chloride of magnesium*, *carbonate of lime*, *silicic acid*, and a comparatively small portion of *iron*. The gases evolved consist of *nitrogen* in large quantity, with *oxygen* and *carbonic acid*.

The sparkling appearance of the waters at the springs is due to the carbonic acid they contain. The quantity generally drunk is from one-quarter to one pint, before breakfast and again in the afternoon. Taken quietly and leisurely, the effect is usually to raise the temperature of the body, to quicken the circulation, to increase the appetite, and to promote the salivary and renal secretions. When headache, loss of appetite, thirst, nausea, mental depression, and a diminished flow of urine follow their use, they should either be discontinued or taken in very small doses.

The accommodation for bathing is excellent, there being good douche, shower, vapor, reclining, swimming, and chair-baths. By the latter, worked with a crane, a helpless invalid is lowered into and raised from the water. The bath is to be taken three or four times a week, not too near the meal-times, and the patient should remain in it from ten to thirty minutes. The proper temperature is 96° to 98° Fahr.

The spring and autumn are the best seasons for taking the baths and waters, though they may be advantageously employed in the winter. And the diseases which are most benefited by them are subacute gout, chronic rheumatism, sciatica, neuralgia, lumbago, rheumatoid arthritis, contracted or rigid joints, dyspepsia, paralysis from rheumatism or metallic poisoning, leucorrhœa, chorea, anæmia, lepra, eczema, and psoriasis.

461. Cheltenham, in Gloucestershire.

Since the cure of George the Third by the waters of the Royal Old Wells, this spa has been a fashionable resort. Situated 8 miles E.N.E. of Gloucestershire,

Cheltenham offers an agreeable permanent residence, particularly for valetudinarians from the East or West Indies. The climate in winter is mild and equable, but rather moist. The town is sheltered by the Cotswold and other hills from the north and east winds. The season lasts from about the middle of April to the beginning of October.

The waters are chiefly taken internally. There are several cold springs, all of them powerfully saline except the Cambray Chalybeate. The waters of the ROYAL OLD WELLS contain chiefly *chloride of sodium*, *chloride of calcium*, *chloride of magnesium*, and *sulphate of soda*. They are but slightly gaseous. Some of the wells of the MONTPELLIER SPA, have in addition to the foregoing, a little *oxide of iron*, and *iodurettted magnesium saline salts*. There is an unusual amount of *silica* in the PITTVILLE saline; while the CAMBRAY spring is strongly *chalybeate*. The Montpellier baths have accommodation for warm and cold bathing, swimming, medicated air and vapor douches, &c.

These springs enjoy considerable reputation for relieving the diseases engendered by a residence in tropical climates, and hence many old Indians with liver affections resort to them. They are also useful in gouty and rheumatic disorders, in the lithic acid diathesis in plethoric and irritable systems, in skin diseases, in dyspepsia with torpidity of the bowels, as well as in some forms of amenorrhœa and chlorosis. The dose is usually from half a pint to one pint before breakfast; it is better to take the water pure, without the addition of any "solution" of the crystallized salts; and it may be warmed if a more than ordinary aperient effect is needed. The spring to be recommended must depend upon whether a simply alterative, or an alterative and tonic remedy be indicated.

462. Purton and Melksham, in Wiltshire.

The healthy village of PURTON in North Wilts, 4½ miles W.N.W. of Swindon, has a dry bracing air. The Spa is 2½ miles from the village, in a field known as Salt's Hole, where a pump-room has recently (1859) been erected for the accommodation of visitors. An analysis of the water shows that it is rich in *sulphate of soda*, *sulphate of magnesia*, *sulphate of lime*, *carbonate of potash*, and *chloride of sodium*. There are also small quantities of *sulphate of potash*, *silica*, *iodide of sodium*, and *bromide of magnesium*; with traces of *iron*, *phosphoric acid*, and *sulphuretted hydrogen*. There is a large amount of free *carbonic acid gas*; and the temperature is 58.50°.

The Purton sulphated and bromo-iodated saline water can be recommended where an alterative stimulant is needed. It seems to have been useful in strumous sores and enlarged glands, threatened consumption, stomach and liver disorders, gouty and rheumatic affections, obstinate skin diseases, as well as in functional derangements of the uterine system. The dose is from half a pint to a pint before breakfast, with half a pint in the evening.

The small town of MELKSHAM lies 10 miles E.S.E. of Bath, in a fine open country. In its vicinity are baths and a pump-room erected over the chalybeate and saline springs. The chief constituents of the waters are the salts of *lime* and *magnesia*, with smaller portions of *soda* and *iron*; and they are artificially charged with gas for exportation. In strumous, rheumatic, and cutaneous diseases, the medicated vapor and douche baths may be employed simultaneously with the internal use of the waters.

463. Leamington, in Warwickshire.

Being less protected by hills than Cheltenham, the town of Leamington, 2½ miles E. of Warwick, has a lower temperature. The climate, however, is genial and bracing, but humid; while it is agreeable and healthy to the flagging invalid during the autumn and winter months.

The springs all lie near the banks of the Leam; their principal salts being,—*chloride of sodium*, *sulphate of soda*, *chloride of calcium*, and *chloride of magnesium*. The chief gas is *carbonic acid*, with great quantities of *nitrogen* and *oxygen*. The most ancient and most used of the springs is the OLD WELL. The water at GOOLD'S SPRING AND BATHS contains more *chloride of sodium*, while CURTIS'S WELL has more *chloride of magnesium* than the others. The VICTORIA WELL AND PUMP-ROOM possesses a weak *sulphurous*, and a *saline chalybeate* spring; and so does LEE'S WELL.

The temperature of the Leamington waters is about 48° Fahr.; and their action is aperient and alterative. They are suitable for the same class of cases as is sent to

the Cheltenham springs; but being more active they agree better with invalids of a torpid habit, than with those of a susceptible irritable temperament.

464. Buxton, in Derbyshire.

For invalids requiring mountain air Buxton may be recommended. Situated 31 miles W.N.W. of Derby, at an elevation of 900 feet, while some of the neighboring hills are 2000 feet above the sea, it enjoys a pure bracing air. Like all mountain districts the climate of Buxton is subject to sudden variations of temperature. The rainfall is rather great; but owing to the absorbent nature of the soil the ground rapidly dries. The season is chiefly from June to October; the winds being sharp and cold late in the autumn, during winter, and early in the spring. Buxton is not to be selected where there is a tendency to internal hemorrhage.

The Buxton waters issue abundantly from several crevices in the limestone rock, at a temperature of 82° Fahr. The chief saline salts in them, are, *carbonate of lime*, *carbonate of magnesia*, *chloride of sodium* and *calcium* and *potassium*, with *silica*, *carbonate of protoxide of iron*, and traces of *fluoride of calcium* and *phosphate of lime*; though so small is the quantity, that in the whole, they only amount to 18.434 grains in the imperial gallon. In the same amount of water Dr. Playfair found (1852) *free carbonic acid*, in weight 704.2 grains, *nitrogen gas* 206 cubic inches, and *carbonic acid gas* 15.66 cubic inches. According to the most recent analysis by Dr. Sheridan Muspratt (1860) the quantity of *nitrogen gas*, at the moment of issue, is no less than 504 cubic inches per gallon. As these waters, minus their gases, have only the composition of ordinary spring-water, their stimulating effects are generally attributed to the nitrogen. They are, however, chiefly used externally: the accommodation for plunge, swimming, and douche baths being excellent. The good which results from the latter is most marked in cases of gout and rheumatism, in severe sprains and old muscular contractions, as well as in cases where it is wished to stimulate the vascular or nervous or digestive systems.

A pleasant drive from Buxton is the picturesque village of MATLOCK, built on the slope of a hill, at the base of which flows the Derwent. It is an agreeable summer residence, and its springs supply large tepid baths. The water, however, has no medicinal properties, though the guidebooks usually describe Matlock as a valuable spa.

465. Woodhall, in Lincolnshire.

This strong saline spring rises in a plain 3 miles W.S.W. of Horncastle, and contains more *iodine* and *bromine* than any other English water. It has also 189 grains of *chloride of sodium* in the pint, with a little *chloride of calcium* and *magnesium*, *bicarbonate of soda*, and *sulphate of soda*. The temperature is 55°. The water is chiefly used externally in rheumatic and cutaneous affections, and in scrofula. Taken internally half a pint acts as a mild aperient.

466. Harrogate in Yorkshire.

High and Low Harrogate, half a mile distant from each other, and 27 miles W. of York, are filled with visitors during the season,—from June until the middle of October. The air is pure and bracing, but somewhat humid. The soil is sandy, so that the walks are soon dry even after heavy rain. Low Harrogate is the most sheltered. The most elevated part of High Harrogate is 596 feet above the sea.

There are upwards of fifty different springs, some of which have been in repute since the end of the 17th century. The waters are all cold, being generally warmed artificially before they are drunk. Dr. Kennion divides the springs into four distinct groups: (1.) The strong sulphurous waters. (2.) The mild sulphurous waters with alkaline impregnations. (3.) The saline chalybeate waters. And (4.) The pure chalybeate waters.

1. STRONG SULPHUROUS SPRINGS.—As types of this class may be mentioned the Old Sulphur Well in the Royal Pump-room, and the strong Montpelier Sulphur Well in the Montpelier Gardens. They are both impregnated with *sulphuretted hydrogen gas* (upwards of 25 cubic inches in the gallon); their chief salts being *chlorides of sodium* and *calcium* and *potassium* and *magnesium*, *sulphide of sodium* and *carbonate of lime*, with traces of *bromide of sodium*, *iodide of sodium*, &c. The waters are alterative, aperient, stimulant, and diuretic; they are taken internally, and used as baths. The dose varies from half a pint to a pint and a half, in three or four divided quantities before breakfast.

2. MILD SULPHUROUS SPRINGS WITH ALKALINE IMPREGNATIONS.—The two most important are the Mild Montpellier Well, and the spring at the Victoria Gardens. They contain much less *sulphuretted hydrogen*, less *chloride of sodium*, and less *chloride of magnesium* than those of the preceding group; but they have in addition *carbonate of magnesia*. They are antacid, alterative, diuretic, and deobstruent; and are used externally as well as internally.

3. SALINE CHALYBEATE WATERS.—One of these springs is in the Cheltenham Pump-room, the other in the Montpellier Gardens. In addition to the salts already mentioned they contain *carbonate of iron*, so that they have a tonic action superadded to their other properties.

4. PURE CHALYBEATE WATERS.—The springs of the Tewit and St. John's Well, have almost the composition of pure water, with the addition of a small quantity of *carbonate of iron*.

Invalids with all forms of chronic disease visit Harrogate to drink the waters. But the cases most likely to derive benefit are the following: Imperfect digestion in men too fond of good living, where the bowels and liver are inactive; habitual constipation; obesity; indurations and chronic swellings of the glands, joints, &c. (the strong sulphur springs): chronic skin diseases, such as eczema, lepra, impetigo, acne, pityriasis, lichen, &c. (the sulphur, beginning with the mild): gouty and rheumatic affections (the strong sulphur): threatened phthisis, especially in young women with disordered menstruation (the mild sulphur, alternately with pure chalybeate); strumous affections (the saline chalybeate); and lupus, constitutional syphilis, chronic ulcers, &c. Very frequently great advantage is derived from the external use of the strong sulphur waters, combined with the internal administration of the chalybeate.

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467. Spa, in Belgium.

Situated near the frontier of Rhenish Prussia, in the beautiful valley of the Ardennes, at the foot of a steep mountain sheltering it from the north winds, is Spa. It possesses the only important mineral springs found in Belgium. The waters of the principal well—the Pouhon—have a temperature of 50° Fahr., and are largely charged with carbonic acid; the chief solid constituents being the *bicarbonates of soda, iron, lime*, and *magnesia*. Spa is rather more than 1000 feet above the sea-level.

The wells of the Sauvenière, Groesbeck, Géronstère, and the three Tonnelets are situated at short distances from the town. Their waters are similar to those of the Pouhon, but the proportion of iron is smaller. The Tonnelet springs are the most gaseous. The water of the last discovered spring, the Barisart, has a temperature of 52°, contains more carbonic acid than the Pouhon, and less iron. It sometimes proves useful where the Pouhon disagrees. This spring is much frequented.

These gaseous chalybeate waters are employed, to the extent of two or three pints daily, commencing with a couple of glasses before breakfast. They impart power, strengthen the digestion, and are valuable in such cachectic and other diseases as require a ferruginous tonic. The season is from the commencement of May until the end of September. During the early part of October the weather is often wet and cold.

CHAUDFONTAINE, in the valley of the Vesdre, has a thermal mineral spring which is used for bathing by sufferers from chronic rheumatism, neuralgia, irritability of the nervous system, &c. The temperature of the water is 92° Fahr. The solid contents are scarcely more than two grains in the pint, and consist of chloride of sodium and carbonate of lime. The surrounding country is very pretty; while there is much to be seen of great interest in the neighboring manufacturing town of Liege, five miles distant.

468. Bagneres de Bigorres, in the Pyrenees.

This celebrated watering-place (1850 feet above the sea) is situated at the foot of the Pyrenees, on the left bank of the Adour, about 35 miles to the southeast of Pau. The season commences in June and ends about the middle of October.

The springs in Bagnères and its neighborhood are numerous, and may be divided into three classes: 1. THE SALINE. The temperature of these waters varies from

124° to 85° Fahr.; the chief chemical products found in them being *carbonic acid, chlorides of magnesium* and *sodium, sulphates of lime* and *soda* and *magnesia, subcarbonates of lime* and *magnesia* and *iron*, an infinitesimal proportion of *arsenic*, with *resinous* and *vegetable extractive matter*, and *silex*. 2. THE FERRUGINOUS. There is only one spring of this kind, properly so called—la Fontaine Ferrugineuse. 3. THE SULPHUROUS. Only one sulphurous spring has much reputation,—that of Labassère; and its waters contain a minute quantity of *carbonic acid, hydrosulphuric acid, chloride of sodium, hydrosulphate of soda, subcarbonate of soda, vegeto-animal matter*, and *silex*.

The general effect of the waters, taken internally and used as baths, is that of a stimulant to the mucous membranes, kidneys, lymphatic system, and skin. They are useful, more particularly, in diseases of the bones and articulations; in chronic rheumatism, and allied disorders, as neuralgia, sciatica, &c.; in atonic dyspepsia from overmental work; and in nervous affections,—hysteria, palpitations, hypochondriasis, gastrodynia, &c., especially if there be biliary derangements. The Labassère waters are beneficial in cases of excessive secretion from the mucous canals, in many skin diseases, and in some morbid states of the abdominal viscera. In anæmic conditions, valuable effects result from the employment of the ferruginous spring. Patients who have been benefited by Pau during the winter may advantageously proceed to Bagnères for the summer.

When the saline waters are taken for their alterative effects, the daily dose is small—about a pint; but if a purgative action is needed, from one to two quarts, in divided quantities, should be drunk daily.

469. Capbern, in the Pyrenees.

Situated about ten miles from Bagnères de Bigorres, the waters of Capbern are of a saline character like most of those in that neighborhood. Their chief constituents are *carbonic acid gas, sulphates of lime* and *magnesia*, with *carbonate of lime*. One authority says that they also contain carbonate of soda, while another asserts that there is not a trace of it. They are deemed useful in congestions of internal organs, and are supposed to have warded off apoplectic seizures, when the cerebral circulation has been sluggish; they stimulate the uterus and ovaries, and have been said to cure sterility; while many cases of chlorosis, leucorrhœa, dysmenorrhœa, &c., seem to have been benefited by them. The dose is from four to six tumblers, early in the morning, taking exercise between each glass. At the same time reclining or douche baths are employed.

470. Bareges, in the Pyrenees.

This village, on the Gave de Bastan, about 47 miles from Pau, is about 4000 feet above the sea. The season lasts from the beginning of June to the middle of September.

The well-known sulphurous and stimulating waters of Barèges are of three kinds, as regards temperature: viz., the *hot source*, the *temperate*, and the *tepid*. The principal baths are the BAIN DE L'ENTREE, 107° Fahr.; BAIN DU FOND, 98°; BAIN DE POLARD, 101°; and BAIN DE LA CHAPELLE, 84°. The waters of all are limpid, have an oily nauseous flavor, and exhale an odor of rotten eggs. They contain *nitrogen, sulphuret of sodium, sulphate of soda, chloride of sodium, silica, lime*, &c. On their surface is found a thin gelatinous kind of pellicle called *barègine*, or *glairine*, or *zoogene;* which is probably of a vegetable character, is emollient and softening, and is supposed to have some peculiar power in curing chronic rheumatism.

These waters are beneficial in inveterate squamous, pustular, and papular skin affections; in some forms of scrofula; in chronic rheumatism, sciatica, lumbago, and stiffness of the muscles or tendons; in strumous and other indolent ill-conditioned ulcers; and in irritation from the presence of carious or necrosed bone. For healing sinuses left by old gunshot wounds they are considered particularly efficacious. Pulmonary cases derive more benefit from Eaux-Bonnes and Cauterets. Moreover, the waters of Barèges are not to be prescribed when there is any tendency to inflammatory disorders, or in heart disease, or for irritable nervous temperaments. They are more powerful and stimulating than the waters of St. Sauveur.

The waters are taken internally, as well as employed in the form of baths, douches, lotions, and injections.

471. St. Sauveur, in the Pyrenees.

Situated on the Gave de Pau, in the valley of Laverdan, this watering-place (2520 feet above the sea) is 44 miles from Pau, 4 from Barèges, and 1 from Luz.

The still Alpine air is mild, and yet bracing. The season is from May until October.

The waters are milder than those of Barèges, but have the same constituents. Their temperature varies from 135° to 80° Fahr. They are useful for women and children, in the same disorders as are sent to Barèges. Hysteria, neuralgia, hypochondriasis, leucorrhœa, and irregularities of the catamenial flow, are much benefited by them. When taken internally they have to be diluted, their greasy properties, from the excess of barègine, being so great. They are mostly used as reclining and douche baths, vaginal injections, &c.

472. Bagneres de Luchon, in the Pyrenees.

This little town, in a magnificent valley surrounded by noble mountains, is 55 miles from Pau, and 2000 feet above the sea. The season lasts from June to the beginning of October. The arrangements for drinking the waters are all good.

There are upwards of 48 thermal sulphurous springs, the temperature of the waters varying from 152° to 62° Fahr. Their chief constituents are *sulphuret of sodium*, *chloride of sodium*, *silicate of lime*, and *silica;* with traces of the *sulphurets of iron* and *manganese*, *iodide of sodium*, *sulphate of potash* and *soda*, and *sulphite of soda*, &c. The waters are efficacious in chronic skin diseases, in stiffness of limbs after dislocations and fractures, in old ulcers, chronic bronchitis, rheumatism, and neuralgia. Also in some cases of torpid digestion, anæmia, hypochondriasis, hysteria, &c. Their effects are injurious when there is a tendency to plethora and nervous irritability. They are drunk, in doses of three or four glasses, pure or mixed with milk; and are used as baths, injections, lotions, eyewashes, &c.

473. Cauterets, in the Pyrenees.

This celebrated watering-place, imbedded among the mountains, in the valley of Laverdan, 3250 feet above the level of the sea, and more sheltered than Barèges, is much frequented by Spanish invalids. July and August are the best months, but September is also good. There are some 32 sulphuretted saline springs, the temperature of the warmest being 122° Fahr.

Some of the waters are very stimulating, causing headache and feverishness. They contain *nitrogen*, *sulphuret of sodium*, *sulphate of soda*, *chloride of sodium*, *silica*, &c. *Glairine* or *barègine*, a peculiar gelatinous substance (see F. 470.), is also present. They are not to be used where there is any tendency to inflammatory affections. The cases most benefited by drinking the waters are chronic derangements of the digestive organs, chronic rheumatism and rheumatoid arthritis, chronic skin diseases, uterine congestions or irritations, bronchial catarrh, the early stages of phthisis, and strumous affections. The waters are often taken diluted with milk.

The baths are especially valuable in rheumatic affections, scrofula, and obstinate skin diseases.

474. Eaux-Bonnes, in the Pyrenees.

Eaux-Bonnes, a village in a sheltered valley at the foot of the Pic de Gers, is 22 miles from Pau. The air is remarkably pure and fresh. The altitude above the sea-level is 2400 feet. The active mineral waters, of which the supply is scanty, have been deemed efficacious in the early stages of tubercular and other chronic diseases of the respiratory organs. They are likewise useful in scrofula generally, in chlorosis, in dyspepsia from want of tone, and in amenorrhœa. The springs are slightly alkaline, and contain *chloride of sodium*, *sulphates of lime* and *soda*, *iodide of sodium*, &c. Their temperature is about 90° Fahr. The sulphurous waters are mildly stimulating; and are taken internally, and less frequently applied in the form of baths. In the commencement only small doses (three ounces) should be taken, the quantity being gradually increased to three or four glasses of six ounces each. While undergoing treatment the patient is encouraged to live as much in the open air as his symptoms will permit. A residence of about a month, for one or two seasons (the season lasts from June to the middle of September) is generally deemed sufficient. Afterwards a trip to Biarritz, for the enjoyment of sea-bathing, may often be taken with advantage.

475. Eaux-Chaudes, Pyrenees.

The position of this village, hemmed in by precipitous limestone cliffs, is wild and secluded. It lies about 26 miles from Pau, and 4 from Eaux-Bonnes. The season lasts from the beginning of July until October.

Of the six springs some are used for baths, others as internal remedies. The hot-

test source is LE CLOT (96°); while L'ESQUIRETTE has the largest amount of salts. The waters contain *sulphuret of sodium*, *sulphate of lime*, and *silica*. They deposit *sulphuraire*, a confervoid growth. The taste of the waters is disagreeable, the smell of rotten eggs being powerful.

The waters (two to six glasses early in the morning) and baths are useful in rheumatism and sciatica, in neuralgia, in threatened pulmonary disease, in scrofula, and in atonic dyspepsia.

476. Ussat, in the Pyrenees.

The mineral baths of Ussat, in the Department of the Ariége, are 70 miles from Toulouse, the inhabitants of which city value them highly. They contain about 11 grains of solids to the pint,—chiefly *sulphates* and *carbonates of lime* and *magnesia*, and *chloride of sodium*, with traces of *arsenic*. The waters belong to the acidulous thermal class; are not at all unpleasant; are soothing to the nervous system; and hence prove useful in hypochondriasis, hysteria, chorea, paralysis agitans, neuralgia, cramp, muscular pains, dysmenorrhœa, irritable conditions of the uterus, &c. Though sometimes taken internally, they are chiefly used as baths. The season lasts from June to October.

477. Vernet les Bains, in the Eastern Pyrenees.

The little village of Vernet, 16 miles from Perpignan, is placed in a deep well-sheltered valley. The waters belong to the thermal sulphurous class, but are only feebly charged with solids—amongst others with sulphuret of sodium.

Where a long course of weak sulphur waters is needed, these baths may be resorted to in the winter as well as in the summer months. Sunny walks may be had on most days in winter, the climate being mild and equable. The waters are taken internally, and employed as warm and vapor baths; and this combination of drinking and bathing is thought efficacious in chronic chest affections.

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478. Panticosa, in Arragon.

This remarkable Spanish watering-place, 56 miles from Pau, is situated at a level of 5800 feet above the sea. It is romantically placed in one of the little green valleys of the Pyrenees; being surrounded by the lofty granite mountains, except at one part through which flows the river Caldarés. There are four springs; two being saline, one sulphurous, and one ferruginous. The chief source is the FUENTE DEL HIGADO, which contains *nitrogen* in large quantity, with feeble proportions of *sulphate of soda*, *chloride of sodium*, *carbonate of lime*, *chloride of magnesium*, and *silica*. Its waters are agreeable, have a temperature of 81° Fahr., and numerous gas bubbles (owing to its free nitrogen) escape with it.

The waters taken internally increase the secretions of the liver and kidneys and skin; produce a sedative effect on the system; increase the appetite and general powers; and in pulmonary cases relieve the cough. They are particularly recommended in laryngeal phthisis, in hemorrhage from lungs or stomach or uterus, and in chronic irritation of the bronchial or intestinal mucous membranes. Where there is softened tubercle, or much debility of system, they do harm. The best part of the season is from the beginning of July till the end of August.

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479. Vichy, in Central France.

This important alkaline thermal bath is situated on the right bank of the Allier, in a large open valley, surrounded by hills covered with vineyards. The altitude is 780 feet. The air is temperate and pure. The season lasts from the middle of MAY until the same time in September.

The springs used at Vichy for drinking and bathing are nine in number; the waters of all being limpid, and having somewhat the taste of soda-water. *Bicar-*

bonate of soda and *carbonic acid gas* form the predominating ingredients; but they also contain small quantities of the *bicarbonates of potash* and *magnesia*, with the *arseniate of soda*. There is also some *barègine*, most abundant at the Source de l'Hôpital. The proportion of chief chemical components, in the sources generally resorted to, is shown in the following table:

Grande Grille, ...	107.8° F.	Bicarb. soda, grs.	37.50	Carbonic acid gas, grs.	6.97	to each 16 ozs.
Puits-Chomel, ...	109.6°	"	39.09	"	5.91	"
Fontaine de l'Hôpital, .	89°	"	38.60	"	8.21	"
Fontaine des Célestins, .	58.6°	"	39.19	"	8.04	"
Grand Puits Carré, . .	110.5°	"	37.57	"	6.71	"
Puits d'Hauterive, . .	59°	"	36.99	"	20.92	"

Wherever the use of strongly alkaline waters is indicated, those of Vichy will prove useful. They may be taken internally, or employed as baths, or used in both ways at the same time. The diseases which derive most benefit are: pulmonary catarrh, debility, and irritability of the digestive organs, chronic enlargement of the liver and spleen, uric acid gravel and calculi, vesical catarrh, chronic gout and rheumatism, diabetes, and some cases of albuminuria. Obesity has been lessened by these waters, and they might be employed with advantage where the blood contains an excess of fibrin. The dose is from half a pint to two pints daily: but they must not be continued too long, lest a superalkaline condition of the blood be induced. The spring of the Grande Grille is in most repute, and is especially useful in liver diseases; while that of the Célestins is best for disorders of the urinary organs, as well as in the uric acid diathesis. The Hospital spring is in favor for chronic gastro-enteritis.

The Vichy waters are exported in considerable quantities, and it is supposed without their undergoing any deterioration.

480. Mont D'Or, in Central France.

At this bath there are six thermal sources and one cold spring. The water of the latter, St. Marguerite, is acidulous from the carbonic acid it contains, has a temperature of 52° Fahr., and is an agreeable drink mixed with milk or wine. The thermal sources are LE GRAND BAIN (108°), the SOURCE OF CÆSAR (113°), the FOUNTAIN CAROLINE (107°), the BAIN RAYMOND (109°), the RIGNY (109°), and the MADELEINE (114°). The ingredients in the different waters only vary in quantity; consisting of the *carbonates of soda* and *lime*, *chloride of sodium*, *sulphate of soda*, with mere traces of *iron* and *alumina*. They all contain an excess of *carbonic acid*. The Madeleine spring is also strongly arsenical.

Besides drinking the waters, most invalids employ warm bathing. The effect is to increase the perspiration; and at the end of a few days to produce "the bath fever" (lassitude, depression, constipation, &c.), which soon passes off. The invalids who will derive benefit from a visit to Mont d'Or are such as have chronic pulmonary catarrh, some kinds of asthma, rheumatism, and congestion of the liver. Mischief will result to persons of a languid circulation, and such as have a tendency to hemorrhage.

The season is from the middle of July to the end of August; but the waters should not be used for more than a fortnight, on account of their exciting properties. The visitors who drink them take three or four glasses daily.

481. Neris, in Central France.

The thermal springs of Néris are resorted to, from May until October, for the purpose of drinking the waters and bathing in them. There are four wells: the temperature of the waters at their source being about 120° Fahr. They are insipid and oily; containing only small proportions of *carbonic acid*, *bicarbonate of soda*, *sulphate of soda*, and *chloride of sodium*. Confervæ grow feebly in the basins. These waters are recommended in cases of nervous and hysterical excitement, in rheumatism, and prurigo.

482. St. Galmier, in Central France.

These waters, owing to their richness in *carbonic acid gas*, are agreeable whether taken pure or mixed with wine; while they have the property of hastening digestion, increasing the appetite, and augmenting absorption from the alimentary canal. The chief salts in them are the *bicarbonates of lime* and *magnesia*.

The St. Galmier waters are cold, and resemble Seltzer water. They are in common use at Lyons, being deemed useful in gastric affections, and for preventing the formation of urinary calculi.

483. Aix-la-Chapelle (Aachen), in Rhenish Prussia.

This town, in which Charlemagne was born and in which he died in 814, about 43 miles W.S.W. of Cologne, is situated in a valley between the Rhine and Maas Rivers, and is surrounded by well-wooded hills. It is 450 feet above the sea-level. There are eight principal springs,—six thermal and slightly sulphurous, and two cold chalybeate. Their therapeutical effects are due to the high temperature of the water (varying from 111° to 131° Fahr.) and the *sulphur* and *chloride of sodium* contained in it. The latter salt is found in the proportion of about 20 grains to the 16 ounces; while the sulphuret of sodium varies from three-quarters to a quarter of a grain. Of the gaseous constituents the sulphuretted hydrogen is the most active, although it is only present in small quantity. The ELISENBRUNNEN is the principal drinking fountain; its exceedingly unpleasant water being derived through subterranean pipes from the hottest and strongest of the sources,—the KAISERBAD. Very rarely the chalybeate springs are employed as an "after-cure;" but they have little power, one containing half and the other three-quarters of a grain of iron in the sixteen ounces, with some carbonic acid.

In doses of a few glasses these clear transparent waters do not produce much appreciable effect; their chief use being externally, as vapor baths, douches, shampooing, &c. The baths have considerable reputation for curing scrofula, skin diseases (acne, psoriasis, and prurigo), hepatic and renal complaints, chronic gout and rheumatism, functional derangements of the uterine organs, rebellious ulcers, and the ill effects produced by the use of mercury or lead. In cases of long-standing stiffness about the joints, as well as in sprains, the rubbing and kneading and stretching of the muscles and articulations which are employed prove very efficacious. The springs are to be avoided where there is any tendency to cerebral, pulmonary, gastric, or uterine hemorrhage. A course of the baths lasts from four to six weeks. The season begins early in June, and ends about the middle of September.

At BORCETTE, or BURTSCHEID, a suburb of Aix, there are several bath establishments. The thermal springs are divided into the sulphurous and non-sulphurous. The most important of the former is the *Trinkquelle;* the water of which contains *chloride of sodium*, with *sulphate* and *carbonate of soda*, and has a temperature of 140° Fahr. The *Kochbrunnen* is the most used of the non-sulphurous springs. The waters of Borcette are recommended for the same class of cases as is sent to Aix. The advantage of the former place over the latter is, that it affords a much cheaper residence.

484. Kreuznach, in Rhenish Prussia.

The rather nauseous and bitter waters of this spa have a considerable reputation for the cure of uterine diseases, as well as of most scrofulous affections. The chief waters are those of the ELISABETH BRUNNEN, having a temperature of 54.50° Fahr. They contain about 90 grains of solid constituents in 16 ounces; chiefly,—*chloride of sodium* (73), *chloride of calcium* (13), *chloride of magnesium* (4), *bromide of magnesium* ($\frac{1}{4}$), *oxide of iron* ($\frac{1}{8}$), with a trace of *iodide of magnesium*, &c. The KARLSHALLER WATER has a temperature of 59°, and 75 grains of salts in the sixteen ounces; the THEODORSHALLE 70.25°, and 87 grains; while for the chief well of MUNSTER the numbers are 81.50°, with from 64 to 76 grains.

In drinking the waters it is better to begin with small quantities, which may be drunk pure or mixed with hot milk. The baths are generally taken tepid; "mother lye" (the brownish glutinous liquid left in the boiling pans, after the salt has been crystallized and removed) being added to the water, in proportions suitable to the requirements of each case. In uterine affections, fomentations and vaginal injections are employed in addition to the baths.

The Kreuznach waters have proved valuable in congestions of the uterine organs, as well as in chronic inflammatory affections of these parts, in hypertrophy and induration, in uterine displacements, and in derangements of the menstrual functions. Dr. Prieger, who has had very great experience in the use of these waters, tells the author that he has never seen a true fibroid tumor of the uterus absorbed through their influence; but when such a growth is œdematous or congested, the waters relieve these complications. Hypertrophies of the mammary glands, cases of chronic skin disease, as well as scrofulous ulcers, are ofttimes benefited by these waters.

The season extends from the end of April until the beginning of October. The stay which a patient should make may vary from six to eight weeks.

The springs of NAUHEIM, a village of Hessen-Cassel, resemble those of Kreuznach, except that they contain rather more chloride of sodium, only a trace of bromide of magnesium, and none of the iodide of magnesium. There is also an abundance of carbonic acid; and the temperature of the four chief springs varies from 72° to 92° Fahr. The waters are drunk and used as baths; while like those of Kreuznach, they are recommended for all strumous affections.

485. Neuenahr, in Rhenish Prussia.

This village, in the mild and picturesque valley of the Ahr, is easily reached from Cologne. Of the springs, the Victoria is the best. Mr. Miller, the late Professor of Surgery in the University of Edinburgh, says that it is the richest of all known brunnens in carbonic acid. It furnishes some 29,792 cubic feet of water daily; an analysis of which has shown the presence of small quantities of *bicarbonate of soda, sulphate of soda, chloride of sodium, bicarbonate of magnesia, bicarbonate of lime, protoxide of iron and alumina, silica*, and free *carbonic acid*.

The waters are taken internally, and applied externally. The dose is from two to five tumblerfuls, early in the morning; with half the quantity in the evening. The temperature of the water is between 78° and 80° Fahr., and the taste is pungent and pleasant, resembling—as an English valet said—"Seltzer-water with the chill off." The best time for the bath is two or three hours after breakfast; the temperature of the water being about 88°, and the time for remaining in it twenty minutes. When the invalid is acclimatized, the douche may be used if needful.

The waters are tonic and antirheumatic; acting especially on the mucous membranes and the glandular system. They are useful in simple dyspepsia, diminished secretion of bile, irritability of the bladder with excess of uric acid in the urine, chronic gout and rheumatism, asthma uncomplicated with organic disease, chronic affections of the larynx or bronchi, eczema and prurigo, and chronic uterine maladies. In a person apparently healthy Dr. Weidgen found that the use of the waters was followed by these effects: A sense of warmth in the stomach soon after drinking; exhilaration; increased flow of urine; increased appetite; and increased salivary and bronchial secretions. After a week the bowels were affected; copious, soft, bilious evacuations being produced. The urine became neutral, but never alkaline.

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486. Ems, Duchy of Nassau.

Ems, or Bad-Ems (as the spa is called, to distinguish it from the old village or Dorf-Ems), lies on the right bank of the Lahn, inclosed in a narrow valley between high mountains, 15 miles N. of Wiesbaden. Ems is 290 feet above the sea-level. The air is mild: the situation attractive. There are several springs. The waters are alkaline, saline and gaseous; while the temperature varies from 86° Fahr. to 153°. The chief constituents are *carbonate of soda, chloride of sodium*, and *carbonate of magnesia;* with small quantities of *carbonate of lime, iron, manganese, potash*, and *lithia*. Their action is that of a mild alterative, diuretic, and laxative; and they are believed to favorably influence all catarrhal affections of the mucous membranes.

The principal drinking springs are the KRAENCHENBRUNNEN and the KESSELBRUNNEN. The waters of the former are clear, odorless, have a temperature of 80°, and leave a soapy taste, owing to the soda they contain. According to Struve each 16 ounces contains 15½ cubic inches of free carbonic acid gas. The Kesselbrunnen or Kurbrunnen waters give out more carbonic acid, and are 118°. The dose is from one to six beakers, each holding about 4 oz. In many cases it is an improvement to add one-third part of goats' or asses' milk to the measure.

The waters are also employed externally, the baths being partly filled overnight to lower the temperature. The BUBENQUELLE (boy's spring), 117°, is used as a vaginal douche; and is in repute for the cure of sterility due to uterine and vaginal leucorrhœa, or to inflammatory affections of the cervix uteri.

The waters generally are recommended in chronic bronchial and pulmonary affections, in the dyspepsia of such as have only a tendency to phthisis, as well as in eczema and prurigo. For the relief of the lithic acid diathesis they are valuable, but less so than those of Vichy. For drinking and bathing, French and German visitors usually resort to Ems in June. The best months are May, June, September, and October. Our own countrymen, however, seem to prefer July and August; though the narrowness of the valley in which this bath is situated causes the air to be very oppressive and relaxing during these two months.

The mineral springs of FACHINGEN, a village 9 miles E.N.E. of Nassau, on the Lahn, resemble those of Ems, the carbonate of soda and carbonic acid being present in rather larger proportions. The waters form an agreeable antacid drink in some forms of dyspepsia.

487. Selters, in Nassau.

This village, in a pleasant valley 37 miles N. of Wiesbaden, is everywhere famous for its mineral springs; an enormous quantity of Seltzer water being annually exported. Selters is 800 feet above the sea-level.

The water has a temperature of 60° Fahr., and contains much more than its volume of carbonic acid gas. It has about 32 grains of solids in the sixteen ounces; chiefly *chloride of sodium* (18), and *carbonate of soda* (9), with minute quantities of *sulphate of soda*, *lime*, *magnesia*, and *iron*. Seltzer water stimulates the stomach; and is a grateful, antacid, slightly alterative drink.

488. Schwalbach and Schlangenbad, in Nassau.

SCHWALBACH or LANGENSCHWALBACH, 8 miles N. W. of Wiesbaden, consists of one long street in the middle of which is the Kursaal. The climate is bracing; the altitude is 900 feet. The gaseous chalybeate waters, with a temperature of 50° Fahr., owe their invigorating properties to *carbonate of iron*, which is held in solution by an excess of *carbonic acid*. They also contain a small amount of the *bicarbonates of soda*, *magnesia*, and *lime*. The chief springs are—the WEINBRUNNEN, near the Kursaal, which contains most iron, and is believed to counteract the evils arising from excessive indulgence in wine; the PAULINENBRUNNEN, the mildest, which was formerly used by invalids from tropical climates with torpid livers, but which appeared to be deserted in 1867; the ROSENBRUNNEN, only employed externally, the baths being heated by steam to 86° or 90°; and the STAHLBRUNNEN, in the northern valley, which is the most exciting of the springs. The waters are drunk fasting, to the amount of one to three glasses, twice a day; and they may be strongly recommended in cases of impaired strength where a ferruginous tonic is indicated, as well as in those examples of dyspepsia and constipation which are due to a torpid and anæmic condition of the walls of the alimentary canal. The bath should be taken about two hours after breakfast, omitting its use every third or fourth day. The best time for a visit to Schwalbach is from the middle of June until the end of August.

Rather more than two miles from Schwalbach, in a pleasant valley, with romantic environs, is SCHLANGENBAD. The climate is pure and bracing, the height above the sea being 930 feet. As a spa, Schlangenbad is of insignificant value, owing to the small amount of solid constituents—only a few grains of *carbonate of soda*, *lime*, and *magnesia*, with *common salt*—in the waters. Warm saline and mud baths are used by the visitors, such amusements being in repute for softening and whitening ("satinizing") the skin, and for allaying nervous irritability. The season lasts from the beginning of June until September.

489. Wiesbaden, in Nassau.

Wiesbaden, the capital of the Duchy of Nassau, lies on the southern slope of the Taunus Mountains, 5 miles N.N.W. of Mayence. It is the most frequented of the watering-places in Germany. The season extends from June until September, but it is very hot in July and August. Owing to the shelter afforded by the several peaks of the Taunus, the autumnal and winter climate is good.

There are some eighteen or twenty thermal springs, but only one is of much importance. This, the KOCHBRUNNEN, rising nearly in the centre of the town, appears literally to resemble a boiling well. The temperature varies from 150° to 160° Fahr., volumes of vapor are emitted, and the water contains some 68 grains of solids in the sixteen ounces. The salts are *chloride of sodium* (52½), with small quantities of *potash*, *lime*, *iron*, *magnesia*, *arseniate of lime*, *bromide of magnesium*, &c. The *carbonic acid gas* is one-fifth of the bulk of the water. Sir Francis Head and Dr. Granville compare the taste to that of weak chicken-broth slightly salted. Taken in a dose of three or four glasses, cooled, before breakfast, it has a slightly laxative and diuretic effect, and increases the appetite. As baths, at a temperature varying from 86° to 98°, about two hours after a light breakfast, the waters are somewhat soothing, while they increase the action of the skin and kidneys.

The cases in which these waters are likely to prove valuable, are chronic gout and rheumatism, hepatic congestion with hæmorrhoids, and chronic skin diseases

connected with abdominal plethora. They will be injurious in debility, in congestion of the uterine organs, or where there is a tendency to apoplexy or any other form of hemorrhage. The invalid may know that they disagree, when prostration, loss of appetite, constipation, irritability, and palpitations are produced; or when the doses give rise to a feeling of disgust, especially if they have been previously regarded as rather agreeable. The course ought not to extend beyond four or five weeks. The country in the neighborhood of Wiesbaden is charming.

490. Soden, in Nassau.

The waters of Soden, in the Taunus near Frankfort, are saline and gaseous, issuing from twenty-three springs, scattered through the village. Their temperature varies from 64° to 75° Fahr.

The most important springs are—the MILCHBRUNNEN, containing 23 grains of solids in the 16 ounces; 17 grains being *chloride of sodium*, 3 *chloride of potassium*, with 17 cubic inches of *carbonic acid gas*. The WARMBRUNNEN has 35 grains of solids, 26 of which are *chloride of sodium;* the *carbonic acid gas* being 35 cubic inches. The WILHELMSBRUNNEN has 117 grains of salts, 104 being *chloride of sodium*, with 48 cubic inches of gas. Whilst the SOOLBRUNNEN has 129 grains, 114 of which consist of the same salt that predominates in the others, together with 14 cubic inches of gas. Where alterative aperients are needed, these waters may perhaps be recommended. They are deemed useful in pulmonary, strumous, gouty, and uterine affections.

One advantage possessed by Soden is the presence of the two ferruginous springs of KRONTHAL; so that the visitor, having employed the alteratives of the first spa, may strengthen the system with the mild chalybeates of the Stahlquelle or Wilhelmsquelle. The climate of Kronthal is useful in chronic bronchial affections.

491. Homburg, in Nassau.

Homburg lies about nine miles northwest of Frankfort, being 600 feet above the sea-level. The air is invigorating and bracing during the months of June, July, and August, but it is injurious to such as have delicate lungs, owing to the temperature being very variable. There are four cold (about 50° Fahr.) muriated mineral springs, all rising near each other in the park of Kurgarten. The most frequented is the ELISABETHQUELLE, containing about 110 grains of salts in the 16 ounces, and being strongly charged with carbonic acid (48 cubic inches). The chief salts are *chloride of sodium* (79), the *chlorides of magnesium* and *calcium* (15), and *carbonate of lime* (11); with small quantities of *carbonate of magnesia*, *sulphate of soda*, *carbonate of iron*, and *silica*. The KAISERQUELLE has more *chloride of sodium* (117), more *chloride of calcium*, and a little more *iron*. The STAHLQUELLE has the same amount of common salt as the Elizabeth spring, but is more ferruginous than either of the others; while the LUDWIGSQUELLE is weak in almost all its constituents. The flavor of all the waters is refreshing, saltish, somewhat bitter, and ferruginous.

Gout, dyspeptic and other derangements of the abdominal viscera, strumous enlargements of the external glands and mesentery, debility of the reproductive organs, constipation, obesity, and hypochondriasis are the diseases most likely to be benefited. From two to four tumblerfuls of the waters are taken fasting during three or four weeks. Though chiefly used internally, there are baths, douches, &c.

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492. Baden-Baden, in Grand Duchy of Baden.

This renowned spa, rather more than 600 feet above the sea, in one of the most delightful valleys of the Black Forest, about six miles from the Rhine, has 16 weak saline springs, the temperature of which varies from 117° to 161° Fahr. The chief spring, and the only one demanding notice, is the URSPRUNG, which has a transparent, inodorous, saltish water. Its chemical constituents are merely about 23 grains to the 16 ounces, 18 grains being *chloride of sodium*. There are also 2½ grs. of *sulphate of lime*, about 1-10 of a grain of *carbonate of iron*, with less than half a cubic inch of *carbonic acid*. Recent analyses have shown the presence of *lithia*, in greater abundance than in any other springs.

Though their efficacy must be slight, these waters are often taken internally. Some drinkers add goat's milk to them, or whey, or aperient salts. But they are

chiefly to be employed where simple hot baths are needed, while the invalid is enjoying beautiful scenery, in pure mild air. They may be recommended in chronic gout and rheumatism, dyspepsia from overwork, nervous affections, &c. The season lasts from the beginning of May until the 1st of October.

The waters of WILDBAD, about thirty miles from Baden-Baden, and situated in the kingdom of Würtemburg, contain only 4 grains of salts in the 16 ounces, and have a temperature varying from 86° to 98° Fahr. Where hot baths and douches are needed in chronic paralysis, rheumatism, &c., a six weeks' sojourn at Wildbad may perhaps be recommended. The climate is very bleak from November until May, and then in the four succeeding fashionable months the heat is most oppressive. Wildbad is some 1320 feet above the sea.

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493. Kissingen, in Bavaria.

Kissingen, one of the most fashionable watering-places of Germany, is situated in a fertile valley, about 30 miles N.N.E. of Würtzburg. Its height above the sea-level is some 800 feet. The tonic, laxative, and alterative waters are all cold (about 52° Fahr.) The most important spring is the RAGOCZY, containing 65 grains of solids in the 16 ounces, according to Liebig, with 41 cubic inches of *carbonic acid gas*. The principal salts are *chloride of sodium* (45), *carbonate of lime* (8), *sulphate of magnesia* (4), *chlorides of potassium* and *magnesium* (5), with minute quantities of *chloride of lithium*, *bromide* and *iodide of sodium*, and *carbonate of iron*. The waters of the PANDURBRUNNEN have rather a smaller amount of solids; while those of the MAXBRUNNEN and of the THERESIENBRUNNEN are very much weaker, and contain no iron.

The Ragoczy spring is most used early in the morning, from three to six glasses being taken. In the evening the milder waters of the Pandur are preferred. The effect is to quicken the circulation and to stimulate the secretions of the mucous membranes generally, but especially those of the alimentary canal. Hence they are valuable in habitual constipation, congestion of the liver or kidneys, in dyspeptic eructations or flatulence, and in strumous enlargements of the glands. They may also do good in threatened tubercular diseases of the mesenteric glands. Gouty and calculous cases also derive benefit.

The baths are prepared from the waters of the wells just named, some of the "mother water" of the SOOLENSPRUDEL being frequently added. This spring has a temperature of 62°, and contains 187 grains of solids in the 16 oz., upwards of 100 consisting of *chloride of sodium*. The astonishing flux and reflux of the Sprudel, some eight or nine times a day, is one of the sights of the town.

About 4½ miles from Kissingen is the spa of BOCKLET, in Bavaria, which contains several chalybeate and a weak sulphur spring. The temperature of the waters is about 52°, while there is rather more than half a grain of *carbonate of iron* in the 16 oz., with 39 cubic inches of *carbonic acid gas*. They also contain a small amount of the *sulphates of soda* and *magnesia*, *chloride of sodium*, *carbonate of lime*, &c. Independently of the constant interchange of visitors between Kissingen and Bocklet, the baths of the latter (especially the "douche ascendante") have a considerable reputation for the cure of sterility and for breaking off the tendency to habitual abortion. Bocklet is 620 feet above the sea.

BRUCKENAU, in Bavaria, is also only a few hours' drive from Kissingen. The waters contain scarcely any salts, but have about a quarter of a grain of *iron* in the 16 oz., with at least 35½ cubic inches of *carbonic acid gas*. Their temperature is 49°. They are often employed by those who, after going through a course of the solvent waters of Kissingen, require a pure mild tonic.

The ADELHEIDSQUELLE is a well-known salt-water spring, found at the small village of Heilbrunn, in Bavaria. Prettily situated, not many miles from Munich, this village is said to be 2400 feet above the level of the Mediterranean. The well affords a comparatively small supply of water, which has a temperature of 50° Fahr. It contains 47 grains of solids in the 16 ounces, upwards of 38 grains consisting of chloride of sodium, with 6 grains of carbonate of soda. There are also small quantities of iodide and bromide of sodium, silica, &c. The alterative effect of these waters renders them useful in all kinds of scrofulous affections. The season is from the early part of May until the end of September. The accommodation for visitors is scanty.

494. Gastein, in Austria.

A few hours' drive from Salzburg is the village of Gastein, in the most beautiful part of the Tyrol. It is one of the highest baths in Europe, being 3200 feet above the Mediterranean. The houses are grouped round the edge of the mountain torrent Ache, which here forms a splendid waterfall. The bracing alpine air is invigorating for such as have strong lungs, but the climate is often too raw and unsettled for the delicate invalid to depend upon it. Mean annual temperature 47° Fahr. July and August are the season months.

There are six or eight very weak thermal springs, having the same chemical composition, but varying in temperature from 95° to 118°. In 16 oz. of water there are only 2 68 grs. of solids, *sulphate of soda* being the chief (1 51). The waters, after cooling to about 90°, are used as baths, and are said to stimulate the nervous system. It seems certain that the prematurely old, the hypochondriac, the paralytic, and the sufferer from chronic rheumatism derive benefit.

The waters of TEPLITZ, in Bohemia, very much resemble those of Gastein as regards temperature and chemical power. They contain only about 4.64 grains of solids in the 16 oz., the *carbonates of soda* and *lime* with *sulphate of soda* being the chief ingredients. The baths are used in gouty and paralytic affections, as well as in rheumatoid arthritis, chronic disease of the spine and large joints, and functional derangements of the uterine organs. The town lies in a fertile valley 640 feet above the sea; the environs are remarkable for their beauty, while the climate is healthy and genial.

495. Friedrichshall, in Saxe-Meiningen.

This place has long been noted for the manufacture of Glauber's salts and common salt. Of late years the purgative waters have acquired a high reputation, more especially for cases where it is necessary to promote excretion from the liver, kidneys, and bowels.

The bitter saline water of Friedrichshall is bright and clear, of a light yellowish tinge, free from smell, and possessing a salt, bitter flavor. According to Liebig's analysis (made in 1847) it contains about 194 grs. of solids in the 16 oz., with 5.32 cubic inches of *carbonic acid gas*. The chief ingredients are *chloride of sodium* (61), *sulphate of soda* (46), *sulphate of magnesia* (39), *chloride of magnesium* (30), *sulphate of lime* (10), with small proportions of *sulphate of potash*, *carbonate of magnesia*, *bromide of magnesium*, *carbonate of lime*, and *silica*. The dose is from three ounces to a pint or a pint and a half, according to the aperient effect required. Large quantities of this water are exported annually to different parts of Europe.

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496. Carlsbad, in Bohemia.

This town occupies the bottom of a narrow, winding valley, on the banks of the Töpel, 70 miles W.N.W. of Prague. The season extends from the beginning of June until the end of September, but the month of May is very quiet, and pleasant, and healthy, although the mornings are often cold. The "cure" generally occupies from five to six weeks. Carlsbad is 1200 feet above the sea.

There are several important springs, chiefly differing from each other only in temperature. The most important is the SPRUDEL, the waters of which bound upwards for four or five feet, and then fall back in foam while giving off clouds of vapor. The temperature is about 165° Fahr., and there are some 45 grs. of solids in the 16 oz. The principal salts are *sulphate of soda* (20), *sulphate of potash* (9), *chloride of sodium* (8), and *carbonate of lime* (2), with small quantities of *carbonate of soda*, *carbonate of iron*, *phosphate of alumina*, and *silica*. The *carbonic acid gas* is nearly 8 cubic inches. The SCHLOSSBRUNNEN contain only half the amount of *sulphate of soda*, double the quantity of *carbonic acid gas*, and have a temperature of 123°. The heat of the waters of the THERESIENBRUNNEN is 131°, and, as regards important ingredients, may be said to resemble the Schlossbrunnen. The MARKTBRUNNEN differ from the others principally in containing a little *iodide* and *bromide of sodium*. The temperature is 130°.

The waters are chiefly taken internally, early in the morning and again in the evening. The dose varies from one or two glasses to ten or twelve, according to the stimulating, and alterative, and aperient effects on the digestive organs and abdominal viscera generally, which it is desirable to produce. The cases most benefited are, liver and abdominal diseases, diabetes, gouty and rheumatic disorders, calculous affections, and hypochondriasis with dyspepsia and constipation. The waters are also useful in rheumatoid arthritis, sciatica, and in jaundice from obstruction by gallstones. Old Indians, with enlarged livers, often derive remarkable relief. Baths of the cooled mineral water are now but seldom resorted to, though for one hundred and fifty years invalids only visited Carlsbad for the purpose of bathing. Sometimes the peat soil from the neighborhood, mixed with Sprudel-water, is used as a poultice, &c.

497. Marienbad, in Bohemia.

Marienbad, in the territory of the Abbey of Töpl and the district of Eger in Bohemia, is about five hours' drive from Carlsbad. The air is pure and dry, but changes in temperature take place rapidly owing to the height of the village—1912 feet above the level of the North Sea. The season lasts from the commencement of May until the end of September.

There are several cold (from 48° to 50° Fahr.) saline chalybeate springs; the chief constituent being sulphate of soda, with a moderate quantity of iron and carbonic acid. The waters when drawn are quite clear, but as the gas escapes they become turbid from deposition of the carbonates. The KREUZBRUNN—the principal spring—has 69 grains of solids in the 16 oz., with 8½ cubic inches of *carbonic acid gas*. The chief salts are *sulphate of soda* (38), *chloride of sodium* (13), *carbonate of soda* (9), and *carbonate of magnesia* (3); with small quantities of the *carbonates of lime, lithia, iron, maganese*, &c. The FERDINANDSBRUNN has nearly the same solid ingredients, but with nearly 14 cubic inches of *carbonic acid gas*. The WALDBRUNN is much weaker in *sulphate of soda* (7), and *common salt* (3), but its proportion of *carbonic acid gas* is 18¾ cubic inches. The waters of these brunnen are all used for drinking. The CAROLINENBRUNN has only 11 grs. of solids in the 16 oz., *sulphate of soda* being the chief; but there are 15½ cubic inches of *carbonic acid gas*. The AMBROSIUSBRUNN is still weaker (7 grs. in 16 oz.), with 13 inches of gas; while the MARIENBRUNN has scarcely any salts (2 grs. in 16 oz.), with 9 cubic inches of *carbonic acid gas*. The well of the Marienbrunn is used only for water and gas baths; but the Caroline and Ambrosius waters are employed internally as well as externally.

The effect of the Marienbad waters is laxative, alterative, and tonic, in proportion to the dose (from one to six tumblerfuls); while they increase the action of the liver and kidneys, and promote appetite. Hence they are particularly valuable in chronic disorders of the abdominal viscera. The mud baths and poultices are made with the Marienbad water mixed with a black mineral pulverulent substance, brought from a neighboring peat bed. They stimulate the skin, heal chronic ulcers, and disperse glandular swellings. The gas baths (carbonic acid with a small amount of sulphuretted hydrogen) soothe muscular and neuralgic pains, remove torpor of the female sexual organs, and generally tranquillize the nervous system.

The bitter saline waters of PULLNA, in Bohemia, are very nauseous and indigestible, while they possess no advantages over the ordinary preparations sold by the chemist. Their chief ingredients are *sulphate of magnesia* (96 grains in the 16 oz.), *sulphate of potash* (82), *sulphate of soda* (12), *chloride of magnesium* (16), *carbonate of magnesia* (6), *with sulphate of lime, carbonate of lime, and bromide of magnesium*. Püllna water is largely exported.

498. Eger, in Bohemia.

This frontier town stands on the right bank of the Eger, 92 miles W. of Prague. In the district, some three miles off, is the spa of FRANZENSBAD. The tonic solvent waters of this spring have a refreshing acidulous taste, a temperature of 52° F., with 42 grs. of solids in the 16 oz. The chief of these are *sulphate of soda* (24), *chloride of sodium* (9), and *carbonate of soda* (6); together with the *carbonates of magnesia lime, iron, lithia, manganese*, and *strontia*, and 40 cubic inches of carbonic acid gas.

The waters of the Franszensbad and other wells are taken internally and employed as baths. They strengthen the nervous system, improve digestion, stimulate the circulation, relieve bronchial affections, and act powerfully on the uterine

organs. Mud and gas baths are especially in favor. The boggy earth is sifted free from foreign matters, and converted into black mud; which is heated to 100°, and which contains sulphate of soda, iron, lime, alumina, and ulmic acid. In this mineralized mud the body is immersed for fifteen minutes, when the patient transfers himself to a plain water bath to remove the dirt. The treatment is said not to be disagreeable; and it may perhaps prove beneficial in chronic skin diseases, indolent ulcerations, old rheumatic affections, gouty deposits, and in paralysis without active disease of the nervous centres. The gas baths are considered as specifics for the cure of scrofulous ulcers.

499. Aix-les-Bains, in Savoy.

This beautiful and sheltered town, 788 feet above the sea, may be reached by railway from Paris in about fifteen hours. The climate is mild but yet bracing, and is especially adapted to invalids from April until October. There are two chief springs; but as they are only slightly mineralized, the effects which they produce must chiefly be due to their temperature,—about 116° Fahr. The SULPHUR SPRING contains but little more than 3 grains of salts in the 16 oz., with a small quantity of *carbonic acid* and *sulphuretted hydrogen gas*. The ALUM SPRING, so called on the *lucus à non lucendo* principle, since it contains no alum appreciable to the senses, has the same composition minus the sulphuretted hydrogen.

The waters are chiefly used externally, and especially in the form of douches. They are valuable in chronic rheumatism, sciatica, rigidity of tendons or muscles after sprains and contusions, chronic skin affections, diseases of the bones, nervous disorders, &c.

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500. Baths of Switzerland.

LEUK or LOUECHE, on the Rhone, stands a little to the left of the high road passing through the Vallais to the Simplon, and is nearly 4500 feet above the sea. There are twenty-three thermal mineral springs, varying in temperature from 95° to 124° Fahr. The latter is the heat of the St. Laurent or Lorenzquelle. All the waters have the same composition, the solid constituents being about 15 grs. in the 16 oz. The chief salt is the *sulphate of lime* (nearly 13): with small quantities of the *sulphates of magnesia* and *soda*, &c. It is the custom to bathe in common; there being four public piscinæ, each about a yard deep, and each capable of accommodating some forty bathers, with their small floating tables. On the first day the patient remains an hour in the water, clothed in a long flannel gown; the duration being daily increased till it extends to four or five hours in the morning, and for a shorter period again in the afternoon. About the twelfth day, an erythematous rash called the *poussée* appears over the body, with prickling sensations of heat, and febrile symptoms; its disappearance being followed by desquamation of the cuticle. The duration of the bath is then gradually diminished by half an hour daily, until the cure is complete in some twenty-five or thirty days from the commencement. This peculiar practice is recommended in cases of scrofula, enlargements of the liver or spleen, chronic gout and rheumatism, obstinate eczema and psoriasis, old wounds and ulcers, calculous affections, &c. The season is from May until October.

PFEFFERS, in the Canton of St. Gallen in the Grisons, is in a wild and sombre dell. It is 2115 feet above the sea. The feeble thermal water is conducted down the romantic glen of the Tamina by wooden tubes, to the hotel and bathing-house at Ragatz, in the valley of the Rhine. The salts in the waters are scarcely equal to 2 grains in the 16 oz.; the chief being the *sulphates of soda and lime*, with *chloride of sodium* and *carbonate of lime*. The temperature is nearly 100° Fahr. The bath is used twice a day, for about half an hour each time; and is useful in calming nervous irritability, and in relieving neuralgia, hysteria, &c. The waters are also used for drinking—from four to eight tumblerfuls. The invalid should be advised to reside at Ragatz rather than at Pfeffers, which generally has a cheerless and sunless aspect. When, however, the fall of snow during the preceding winter has been less than usual, the supply from the hot spring is so diminished in quantity, that sufficient water cannot be conveyed to Ragatz. The season lasts from the beginning of June until the end of September.

TARASP, on the right shore of the Inn in the Grisons, has cold gaseous springs somewhat resembling those of Marienbad. There are numerous wells, having their source in a rocky hollow some 4300 feet above the sea. The chief are the Grosse Quelle and the Kleine Quelle, their composition being similar, and their temperature 45° Fahr. Their salts (95 grs. in the 16 oz.) consist of *chloride of sodium* (29), *carbonate of soda* (27), *sulphate of soda* (16), and *carbonate of lime* (12), with small quantities of the *carbonates of magnesia* and *iron*, *iodide of sodium*, *sulphate of potash*, &c. The *carbonic acid gas* is 32 cubic inches. These aperient and resolvent waters are useful in plethora of the abdominal viscera, and in incipient phthisis.

ST. MORITZ, Upper Engadine, Grisons, lies 5863 feet above the sea, in a valley surrounded by high mountains, close to large glaciers. This height will be better appreciated by remembering that Ben Nevis, in Invernesshire, is 4380 feet high, and Snowdon, in Caernarvonshire, 3571. The village of St. Moritz is about a mile and a half from the baths; the waters of which are strongly chalybeate, with a large amount of free carbonic acid. They are taken internally, and used as baths. The air is cold and bracing and stimulating: there are sudden changes of wind. In July, at night, the thermometer is often as low as 31° Fahr. The average temperature during January and February is 14°. The mean barometric pressure at the Kurhaus is 24 inches (on the English coast it is 30). The removal of one-fifth of the atmospheric pressure gives lightness and elasticity to the physical and mental feelings. The air is suitable to such as have a sluggish circulation, and unexcitable nervous system. In the early stage of phthisis benefit has accrued from a residence in the neighborhood of St. Moritz, even during winter. When accommodation cannot be got at St. Moritz, it may usually be obtained at one of the villages in the valley—at Samaden, Pontresina, or Silva-Plana. The Bernina Hotel, at Samaden, is open all the year round. Dr. Berry, at St. Moritz, receives patients. Dr. W. Bayes has strongly recommended (*Medical Times and Gazette*, p. 400, London, October 3d, 1868) St. Moritz as a winter residence for cases where steady cold and extreme tenuity of air are indicated.

BADEN, a few miles from Zurich, on the left bank of the Limmat, has several thermal gaseous springs. The temperature of the waters ranges from 117° to 122° Fahr., and the salts are in the proportion of 34 grs. to the 16 oz. The principal are, *chloride of sodium* (13), *sulphate of lime* (10), smaller quantities of the *carbonates of lime* and of *magnesia* and of *strontia*, *sulphate of soda*, and the *chlorides of potassium* and *magnesium*, &c. There are 22 cubic inches of *carbonic acid gas*, 125 of *nitrogen*, and an odor of *sulphuretted hydrogen*. The action of these waters is chiefly diuretic and constipating. They are recommended in gouty and rheumatic diseases, in chronic diarrhœa with congestion of the bowels, and in incipient phthisis. They are used internally, and externally as baths and douches. The climate of Baden being mild, invalids often remain throughout the winter.

BIRMENSDORF has bitter purgative waters resembling those of Püllna. They are cold (46° Fahr.), have only traces of carbonic acid gas, and their solid constituents slightly exceed 5 grs. in the 16 oz. They are used principally for exportation.

SCHINZNACH, in the canton of Aargau, in a valley through which flows the Aar, five miles from Baden, is well known for its saline sulphurous thermal spring. The temperature of the waters is about 94 Fahr., the solid constituents being nearly 15 grs. in the 16 oz., with 1½ cubic inches of *carbonic acid gas*, and rather less of *sulphuretted hydrogen*. The chief salts are, *chloride of sodium* (5), *sulphate of lime* (4), *sulphate of magnesia* (2), *carbonate of lime* (1), *sulphate of soda* (1), with minute quantities of *carbonate of magnesia*, *alumina*, and *silicic acid*. The invalids both drink and bathe; the baths being used for twenty minutes at first, and afterwards for a longer time if necessary. The *poussée* is milder, but appears more quickly than at Leuk. The waters have a reputation for relieving strumous and rheumatic affections, for curing skin diseases, and for healing callous spongy ulcers. The season lasts from the middle of May to the end of September. The climate is mild. Schinznach lies 1060 feet above the sea-level.

WILDEGG, close to Schinznach, has been gaining repute for some few years as an iodated and bromated spa. The spring rises through an artesian well. The supply of water is scanty. The analysis of Dr. Lauć shows the solid contents in 16 ounces to be 110 grains. The chief are, *chloride of sodium* (80), *chloride of magnesium* (12), *sulphate of lime* (14), with *iodide of sodium*, *bromide of sodium*, *chloride of strontium*, &c. There are nearly 2½ cubic inches of *carbonic acid gas*. These waters are recommended in strumous diseases, and in chronic glandular swellings.



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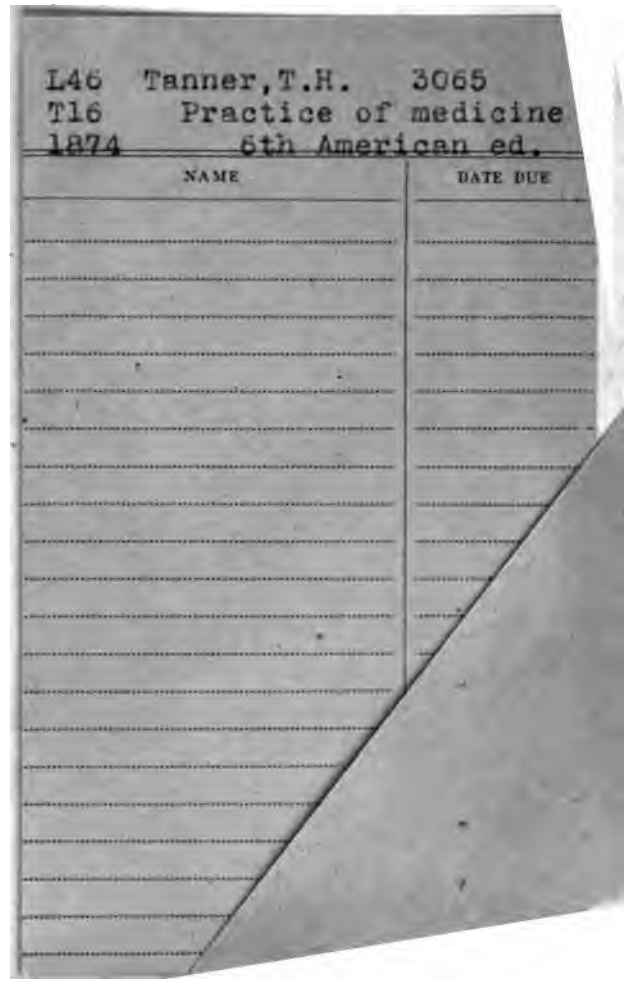
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